F43

INFANTRY JOURNAL

2 1918.
OF MICH.
LARY

The UNITED STATES
INFANTRY ASSOCIATION
WASHINGTON, D.C.

JULY, 1917

OFFICERS OF THE ARMY

and other branches of the service have availed themselves of the diversified facilities of the Riggs National Bank

for over three-quarters of a century

Loss of time and trouble may be avoided by arranging with this bank for the

Collection of Your Pay Checks

the transmission of funds by mail or telegraph; the issuance of Letters of Credit or Travelers' Checks in your favor for convenience while traveling, and the performance of various other services which a progressive bank like this is able to render.

¶ "Satisfactory and Expeditious Service" is our motto,

Deposits Accepted by Mail *Correspondence Invited*

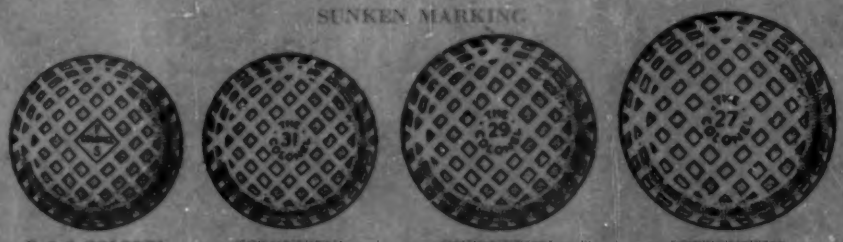
The Riggs National Bank

Washington, D. C.

Capital, $1,000,000 **Surplus, $2,000,000**

COLONEL GOLF BALLS

SUNKEN MARKING



F & S COLONEL
Small size, non-floater
$1.00 each $12.00 doz.

COLONEL 31
Small size, non-floater
75c each $9.00 doz.

COLONEL 29
Medium size, non-floater
75c each $9.00 doz.

COLONEL 27
Full size, floater
75c each $9.00 doz.

ARCH COLONEL
Small size, non-floater
65c each $7.50 doz.

CRESCENT (Red)
Full size, floater
65c each $7.50 doz.

BRAMBLE MARKING
Small size, non-floater, 65c each, $7.50 doz.
COLONEL 31, RED & BLUE CRESCENT. Full size floater—non-floater, 50c each, $6.00

ST. MUNGO MFG. CO. OF AMERICA

121-123 Sylvan Ave., Newark, N. J.

NEW YORK, 36 Warren Street
BOSTON, 143 Federal Street
PHILADELPHIA, 1301 Chestnut Street
CHICAGO, 36 So. State Street
SAN FRANCISCO, 46 Kearney Street

INFANTRY JOURNAL

Vol. XIV July, 1917 No. 1

PUBLISHED MONTHLY BY THE UNITED STATES INFANTRY ASSOCIATION, UNION TRUST BUILDING, WASHINGTON, D. C. EDITOR, MAJ. FRED R. BROWN. BUSINESS MANAGER, G. H. POWELL. COPYRIGHT 1917 BY THE UNITED STATES INFANTRY ASSOCIATION. ENTERED AS SECOND CLASS MATTER AT WASHINGTON, D. C., UNDER THE ACT OF MARCH 3, 1879

CONTENTS

TEAM WORK....Captain Frank Tebbetts.... 1
MACHINE GUNS AND WIRE....Captain Henri Carre, French Army.. 4
FIELD FORTIFICATION....Authentic Sources.... 21
PRACTICAL PLAN FOR TRAINING INFANTRY...Captain W. N. Hughes, Infantry..... 36
LETTER TO A TRAINING CAMP STUDENT.... 49

VARIED GROUND:
- Platoon Commander in the Trenches.... 53
- If Not, Why Not?.... 55
- Random Thoughts.... 55
- Casualties among Medical Officers.... 56
- Names.... 56

EDITORIAL DEPARTMENT:
- How to Maintain Our Families.... 57
- Universal Service vs. Volunteerism.... 58
- Auto Infantry.... 59
- Pelion upon Ossa.... 59
- At the Threshold.... 60
- More Team-Work Needed.... 61

NIGHT OPERATIONS:
- Military Topography and Map Reading.... 62

BOOK REVIEWS.... 72
What a Company Officer Should Know — Battle Fire Training — Primer for the Officers' Reserve Corps.

UNITED STATES INFANTRY ASSOCIATION.... 73
Officers—In Union There Is Strength—New Members.

THE SUBSCRIPTION PRICE OF THE INFANTRY JOURNAL IS $3.00 PER YEAR.
INDIVIDUAL MEMBERS OF REGULARLY CONSTITUTED SERVICE ASSOCIATIONS THAT EXTEND THE SAME PRIVILEGE TO OUR MEMBERS MAY SUBSCRIBE AT THE SPECIAL RATE OF $2.00 A YEAR.
SUBSCRIBERS SHOULD NOTIFY US PROMPTLY OF FAILURE TO RECEIVE THE INFANTRY JOURNAL.
The address of subscribers is not changed except upon request.
THE PUBLICATION COMMITTEE IS ALWAYS GLAD TO CONSIDER ORIGINAL ARTICLES OR MATTER THAT HAS NOT APPEARED ELSEWHERE IN PRINT OF POSSIBLE INTEREST IN THE INFANTRY JOURNAL'S FIELD.
ALL CORRESPONDENCE SHOULD BE ADDRESSED TO THE SECRETARY.
IT IS REQUESTED THAT AUTHORS DOUBLE-SPACE ALL TYPE-WRITTEN MANUSCRIPTS.
THE INFANTRY JOURNAL PAYS FOR ALL ORIGINAL ARTICLES ACCEPTED.

THE UNITED STATES INFANTRY ASSOCIATION
UNION TRUST BUILDING WASHINGTON, D. C.

An interesting and thorough discussion of marches, advance and rear guards, combats, outposts, and other ordinary operations of small commands of Infantry and Cavalry.

Third Edition

Illustrating the fundamental principles of minor tactics by the applicatory method of instruction so successfully employed at the Army Service Schools at Fort Leavenworth, Kansas.

TACTICAL PRINCIPLES AND PROBLEMS

By Captain M. E. HANNA, General Staff

Formerly Instructor, Department of Military Art, Army Service Schools

Beautifully printed on good paper, in large, clear type, and bound in cloth.
453 pages, 2 maps, in color, and 3 cuts.

General Agents: The U. S. Infantry Association
Union Trust Building, Washington, D. C.

A book that should be purchased without delay by all officers of the Regular Army and Militia who are beginning the study of tactics, for whom it has been specially written.

Price, $2.50
Postpaid

A six months' course of tactical instruction, that may be followed with great benefit by the student who is compelled to work without the assistance of an instructor.

INFANTRY JOURNAL

VOL. XIV JULY, 1917 No. 1

Team Work

By Captain Frank Tebbetts

MOST technical men come to have great faith in the mechanical as differentiated from the personal elements of their occupation. It is perhaps natural to find people, who have perfected machines, possessing large confidence in the ability of those machines to operate themselves. Bridges, locomotives, steamships, or tractors appeal to the imagination because, while created by the hand of man, they assume individualities and appear almost to justify the faith which would expect them to exist and operate without man's directing intelligence. And yet we know that these wonderful structures are, with all their marvelous complexity, but servants of the human will that called them into being. The human equation, the mental force, the *man quality* behind each of them, is all that makes them different from any other group of fragments from the mineral or vegetable kingdom. Take away from them the human leadership and, ingenious as they are, a short space of time will find them reduced to a ruin of decay and rust, like the old De Lesseps machinery which the modern canal builders found buried in the jungle at the Panama Canal. The inventor who forgets the operator, the navigator, the engineer, the motorman, confronts certain failure. Machinery has achieved great things, has made possible stupendous undertakings, has shared with art and philosophy the highest honors of modern times, but machinery can neither reason nor moralize and is, therefore, only a blind slave after all.

The profession of arms has long and properly been regarded as a technical profession. It has long and substantially laid claim to definite records of experience and to fixed methods of practice, which may be taught and applied just as the principles of any technical occupation may be taught and applied. As the modern fighting machine has developed out of the barbarian hosts of mythological ages, and as jungle warfare has given way to the strategical fencing of skilled armies, there has grown up around the business of soldiering a scientific terminology, a mass of valuable historical precedent and generally accepted practices which form the basis of the modern structure of military science. In this the profession of arms is not different from the other learned professions. Most people are somewhat slower to realize that the trained fighting man is as necessary an adjunct of a progressive civilization as the trained priest, the trained physician, or the trained advocate, but in time this conviction must be fully and universally accepted.

Like the other professions, and perhaps more than they, the profession of arms has come to rest much of its faith upon the mechanical superiority of the technique which it has adopted. And while, as I have already pointed out, this result is probably natural and to be expected, still we must not forget that to omit the "man quality" in an army is far more disastrous than to omit it from the steamship, the bridge, or the locomotive. Reliance upon mechanical autonomy will in the one case result in destruction and decay, in the other, in defeat and dissolution. However, highly trained, however superior in technique troops may be, it should be remembered that they are not gears and pulleys, but human beings, and therefore likely to be swayed by human emotions and controlled by human ambitions.

I do not wish to create the impression that I am deprecating the importance of routine training. Any elementary student of psychology understands full well the importance of the force of habit, the tremendous influence of mechanical repetition, and the value of the lesson "learned by rote." It will always be possible to defeat untrained troops of a high order of intelligence with trained troops of a low order of intelligence. The good habits formed at drill, in times of peace, are the secret of success in battle in time of war. When the mind is confused, the heart faint, the senses dulled by surprise or fear, logic fails, and the body is controlled by habits formed by the long repetition of a course of action it has been thought wise to adopt. A small, well-trained army is worth more than almost any number of intelligent, well-meaning but purposeless patriots.

In the training of our efficient army, however, we must not neglect a careful study of the human individual. It has been soundly said that the vital elements of any military organization are arms, numbers, training, and morale, and that morale is more important than all the others combined. This means that troops possessing every necessary quality except morale are almost certain to be defeated by poorly trained, poorly armed, and small numbers of troops possessing plenty of *morale*. History abounds in illustrations which prove this to be the lesson of experience. The Boers, the Goths, the Tartar tribes, the guerilla bands of the Confederacy, Washington's continentals crossing the Delaware, and the Massachusetts farmers at Bunker Hill are good examples of fighting men with tremendous morale who played havoc with trained troops. The acceptance of this well-understood principle of military science does not destroy the importance of trained troops, but it *does* mean that troops whose morale has not been fully developed are not properly trained. The Japanese army is a good example of a trained army that has morale. The Chinese army illustrates very well the type of trained army that has little morale. The Russian army in the recent Manchurian campaign indicates how splendidly a poorly trained and poorly equipped army, *with morale*, can fight against a top notch antagonist.

Morale, *esprit de corps*, is merely capitalized emotionalism. Get trained men to take pride in their organization, to believe in their cause, to trust their leaders, to have faith in themselves, and they will be invincible. To do this requires something more than routine training. It means the development of

that indefinable something which we speak of in amateur athletics as "team work"—the spirit of cooperative loyalty which gives to the work of the organization the "punch" necessary to insure victory.

Team work ought not to be more difficult of attainment for a company, a battalion, a regiment, or an army, than for a baseball team. The principles involved are the same. It simply means the stimulation of those ideals of conduct and duty which result in voluntary and enthusiastic response from officers and men. It requires only a sufficiently clear knowledge of human nature to understand that the average officer or man can be more easily led than driven. And in the discharge of routine tasks it contemplates enough intelligence on the part of the taskmaster to enable him to hold the interest and attention by making the work attractive.

On the other hand, there can be no more pernicious influence in military work of any kind than mere ambition for popularity. We have all seen that ambition spells the ruin of good officers and good outfits. A desire for popularity is inherently selfish and destructive of all discipline. The organizations in which officers have sought to be popular with the men at the expense of discipline are sure to be the ones to suffer most severely in the field. Our people as a rule seriously misunderstand this principle of military training. It is the general opinion that a good officer is usually a popular officer. This is indeed so far from true that it is safe to say that the precise opposite is more often correct. Popularity is well enough if it comes naturally and unsought, but, as an object to be striven for, it strikes at the very foundation of military efficiency. A military organization can never be a self-governing body; it is, and must be, an autocracy. It frequently happens, especially with citizen soldiers, that those plans which best conserve the health, welfare, and efficiency of the organization are disagreeable to the majority. It is the officer who goes serenely and firmly ahead with what he knows to be right who best prepares his men for the test of combat.

Team work can be had without surrender to the desire for popularity. A spirit of fairness, intelligent understanding of human nature, and the power to inspire enthusiasm in the task are the avenues to success. Morale—"team work"—cannot be omitted from the program of instruction of a successful army. Just as long as we neglect that element of training we shall walk in the shadow of disaster. Like the old Chinese armies before the Tartar tribes, like the Roman legions before the Gothic invasion, like the British regulars in South Africa, like the Hessian mercenaries at the Battle of Trenton, we shall then face the possibility of overwhelming defeat at the hands of unscientific fighting men who have developed morale.

Machine Guns and Wire[1]

By Captain Henri Carre, French Army

IT has been said that the present war is a war of material; this observation is incomplete and inadequately characteristic, because the gigantic conflict in which the two halves of the old world face each other put into play not only all the creations of war time industry, all the resources in materials and men, all the riches of the belligerent nations, but also all the moral forces of the armies and the races. With the combatants it is a struggle of endurance of fatigues, of efforts, and of bloody sacrifices; with the people, a struggle of patience against trials, sorrows and miseries—a war of wearing out, but a wearing out of morale as well as of material, because the moral forces are worn down like the physical; because the hearts and souls are used up in prolonged contact with suffering, as are cannons by the repeated friction of the projectiles; a war where, according to the principle enunciated by the Japanese, the triumph will come to the one who will be capable of holding out a quarter of an hour longer than the adversary; where that side will win which will have been animated further by the spirit of sacrifice!

But if, in order to determine the victory, the material factor does not enter alone into the reckoning, it will play nevertheless a considerable rôle, on account of the continual and refined perfections carried out on both sides with

---

[1]From the *Revue des Deux Mondes,* October 15, 1916. Translated by Majors Barker, Lynch, Parker and Churchill.

Translators' Note: 1. This article from one of the foremost French reviews describes the application to modern warfare of the powerful combination of machine guns and barbed-wire entanglements.

In succession, the writer treats of the origin, history and development of machine guns, gives a brief description of the principal French and German weapons, respectively the St. Etienne or 1907 model and the Maxim, and discusses their tactical employment, mentioning their use in "tanks."

Wire entanglements, the history of their use, their construction and destruction, their tactical and also their strategical value are then treated in the same manner.

The paper concludes with the citation of actual episodes and with the inevitable French indulgence in rhetoric, a portion of which has been omitted by the translators.

2. The description given in this paper only emphasizes the importance of these two great factors of the present conflict. The enormous extent of wire employed makes it necessary that all line troops be instructed both in building and destroying it.

The ever-growing use of machine guns calls for the most careful training of the detachments and of men in depots destined to replace casualties. The universal opinion is that the efficiency of a machine gun depends not upon its being of any particular type or make, but upon the perfect training and skill of its crew.

Most combatants questioned as to the merits of the various types agree that the German Maxim is the most efficient, except for the single objection that, without water supply, it is useless. It has happened that these water-cooled guns isolated in a great combat have been cut off by barrage fire from their water supply and have consequently become incapable of firing when their coolers were exhausted.

equal ardor, in the art of killing in all its forms, and in the science of destruction in all its aspects.

It had to be thus because the conflict opened at an epoch of marvelous scientific progress, because the terrible scourge had been prepared, wished for and launched by a nation full of industrial expansion, having acquired in this material domain a colossal advance; where all inventions relative to war had been encouraged, adopted, stored away, militarized, and where the industrial mobilization was set in motion at the same hour and with the same automatism as the military mobilization.

The war has therefore put in use an infinite variety of instruments of destruction, at the same time that, by a curious anachronism, it has resuscitated old weapons of another age; but, for all that, excepting the infernal German chemistry, the invention, definitive and signal, which will revolutionize the art of killing has not yet made its appearance.

Heavy artillery and its power have been known long, the torpedo and the submarine mine have been proved, and we were not ignorant of dirigibles or of the possibilities of aerial bombardment.

But that which has been one of the revelations of the war is the extraordinary power of a light weapon, protected by a common, every-day artificial obstacle; it is the coupling of an astounding killing machine with a tenacious accessory defense; it is the multiplication of the terrible reaper joined with the development of an inextricable network of metal; it is the redoubtable combination—machine guns and wire.

Nevertheless, the machine gun has existed a long time as a weapon of war, and it was not even a German invention; the use of the wire entanglement was not a new thing, and neither was it the idea of a German brain; but the extraordinary power of a simple trench provided with machine guns, themselves protected by a network of metal, has been demonstrated in a series of bloody revelations.

What is a machine gun? A portable weapon that three men suffice to serve, that a grain of sand can jam, and whose mechanism can be put out of order by a blow. What is a wire entanglement, if not a rudimentary fence, commonplace and homely; but protect the approach to one by the planting of the other, create an inextricable zone that will hold an attack inexorably under the murderous *rafales*, join the destructive power of the arm to the vicious resistance of obstacle, and you will have created the most redoubtable of barriers, calculated to break the *élan* of the most determined of offenses.

We have denied to the German race all inventive genius; we should perhaps except all that relates to the domain of war. Without doubt France remains the terrain of creative imaginations, the great sower of fecund ideas, but, aided by its murderous instinct and its crafty spirit, the Germanic brain has produced some machines which one would say were inspired by the genius of evil—among them the combination of machine guns and wire is one of the most infernal.

2. The machine gun is defined as a single-barreled firearm shooting at great rapidity the infantry cartridges and functioning automatically; that is to say, not requiring any other energy than a part of that produced by the de-

flagration of the powder gases at each shot fired.

Applied to our present arm the word *mitrailleuse* is incorrect; its true name should be *fusil-machine,* as the Germans called it *gewehrmachine* and the English *machine gun.*

The word *mitraille,* very old, is applied to pieces of iron with which in former times the cannons were loaded. Outside of a very irregular fire, they resulted in little more than a considerable wear on the bronze guns. To remedy that, the idea was conceived, on the appearance of guns on wheeled mounts in the fourteenth century, of joining in parallel several light guns called *traits à feu.* They were the *ribaudequins* or *orgues,* thus named because their appearance recalled that of organ tubes joined together; but on account of the difficulty encountered in producing a simultaneous fire their efficacy remained only mediocre. Also in the sixteenth century, Leonardo de Vinci, the universal genius who touched on all the sciences and on all the arts, applied himself to searching for machine weapons of which several designs from his hand remain preserved till this day.

In about the same epoch there appeared the case shot, a cylindrical envelope enclosing scrap metal, which burst only after it left the mouth of the gun. The deterioration of the bore of the cannon was thus prevented. Later, J. B. de Gribauval, Inspector General of the Artillery, perfected the case by substituting regular spherical bullets for the scrap metal.

But the idea of an arm with several barrels was taken up again only two centuries later, toward 1830, in Belgium, where a former officer of the Grande Armée, Falschamp, invented a machine gun composed of barrels assembled in parallel in a prismatic sheaf and loaded by the breech with a projectile detonating on percussion. His best model made in 1857 had the aspect and weight of a piece of artillery, was composed of 50 barrels of about the caliber of a musket, and fired 100 bullets a minute up to 2,000 meters, quite a range for that epoch.

In America the War of Secession led to the creation of new machine guns; the best known was the Gatling, with six, eight or ten barrels. It was fired by a crank turned by hand. Theoretically it was to deliver 300 bullets per minute, but the results were mediocre.

In France, during the last years of the Empire, the machine gun, system Reffye, called *canon à balles,* made its appearance. It was composed of a bundle of twenty-five barrels, loaded by means of a block loader of twenty-five cartridges; the latter were struck by twenty-five hammers maneuvered by a hand lever. It delivered 150 shots per minute with a range of 2,500 meters. Drawn by artillery horses and worked by the artillery servants, its object was long-range small-arm fire, but notwithstanding the hopes entertained and its impressive name, these machine guns were altogether deceptive.

About the same time Bavaria adopted a similar weapon known under the name of Feld machine gun; a single battery of four guns went without note through the war of 1870. None of these weapons was automatic, since they were worked by human energy.

Some years later the English and the Russians adopted another model of Gatling machines, but they were found to be too heavy, and there arose a gen-

eral demand for a lighter arm not drawn by horses during the fighting, light enough to be carried everywhere by the infantry, and only requiring a minimum of servants. The Maxim gun was the first to comply with these conditions; the automatical machine gun had now been invented. Its first type was elaborated by Hiram Maxim after he had spent seven millions on his studies, contracts and experiments. A model fit for practical service was thus realized as early as 1882 and adopted immediately by the English army, who experimented it in their colonial expeditions.

3. With us, the principal models actually in use are the Saint-Etienne or 1907 mitrailleuse, the Puteaux mitrailleuse, and the 1914 Hotchkiss. Let us say a few words respecting the characteristics of the Saint-Etienne.

The motive principle is gas borrowed from the barrel through a hole of 4.8 mm.; these gases, entering a cylinder called the *gas chamber,* propel forward a piston running parallel to the barrel and then escape into the air through appropriate openings; at the terminus of its course the piston is repelled by a recuperative spring. It is this forward and backward motion which automatically secures the complete working of the machine, including the opening and closing of the breech with extraction and ejection, the cocking, striking and firing, and the feed. The firing is regulated by a special device which allows any cadence from 10 to about 500; it can fire at full speed or slow. The feed is ensured by means of rigid nickel steel bands carrying twenty-five cartridges.

This machine gun has no water-tube cooler like its German rival, the consequence being that accelerated fire generates great heat, and with an intense firing, the barrel may reach the dark red temperature of about 800 degrees. But this heat does not interfere with the ballistic qualities. Made of a special manganese steel, the barrel does not lose its temper; in fact it is retempered by action of the air in cooling and returns to the state in which it was previous to the firing.

Carried on a tripod, it can be brought into battery in two positions—normal or lying on the ground. In the first, the gunner has a seat on the trail; in the second, he lies down on his back alongside his gun.

The problem of transportation is an essential one. The best possible solution has been sought for providing the infantry with a weapon able to accompany it anywhere. On the road and during marches of approach, in zones well defiladed, the guns and their immediate supply of ammunition are transported either on pack animals or in light horse-carts. When under actual fire or when it is threatened, the animals or carts are unloaded. The elements of the piece are then carried by the men and put together before being brought into battery.

The extra rapid expenditure of projectiles is one of the characteristics of the machine gun. According to the type used, the theoretical velocity varies from 400 to 700 shots per minute. But this enormous velocity is only reached when an engaged band is in full activity; the time necessary for the introduction of a new band must be deducted.

On the whole, it seems that the maximum is reached when a machine gun fires 400 projectiles *during* a minute;

this is a *prestissimo* movement representing seven beats per second. From a tactical standpoint, it is useless to go beyond this, and an uninterrupted fire of more than a minute on the same target is seldom justified.

As the machine gun rests on a fixed support, all the projectiles ought theoretically to follow the same course; in fact, owing to the vibrations of the piece and the play of the aiming apparatus, this does not occur. Each bullet describes its own curve and the whole of these curves forms a very tight, but very narrow *sheaf*, which may be compared to the stream of water ejected from the nozzle of a watering hose. In the sweeping fire, which is the normal one, a certain number of sheaves are directed in juxtaposition on the entire front of the objective. It follows that, when they strike the ground, the density of the bullets is terrific and that an extraordinary effect of destruction of the unsheltered troops is obtained.

The effect of machine guns on steel shields, armored plates or obstacles is the same as that of rifles. On wire entanglements, a rather serious but extremely localized effect of destruction is obtained by the clamped fire of some thousands of cartridges.

4. Upon the whole, the machine gun is a light semiportable and extremely deadly weapon, only requiring a few servants. On a given front it thus secures a saving of men, and this is the reason why it enjoys such a favor in the German army.

In position it is very slightly visible; it is even easy to conceal it completely. On the other hand, it immediately betrays its presence when it begins firing. The noise of even a furious rifle fire cannot be mistaken for the regular and extra-rapid rhythm of its rattle. Still more, the dry, harsh, rabid and hurried crepitation of quick-firing machine guns sometimes even dominates the roar of big shells. The fact seems incredible if we compare the caliber of an 8-mm. machine gun with the caliber of an ordinary semi-heavy howitzer of 105 mm., but it has more than once been established.

Although their mechanism is complicated, the machine guns now in use are very strong. Some delicate parts may be broken during the fire, but duplicates are always at hand, and an experienced squad will replace them in a few minutes. It is a pure matter of training.

5. Let us now examine the German machine gun.

There only exists one model, the Maxim, which is distinguished by its cooling system, its transportation, and its rapidity of fire.

The barrel is surrounded on its whole length by a metallic case full of water for the cooling. After 600 or 800 shots the water begins to boil, and there occurs an escape of steam which is troublesome for the gunner and which would disclose the presence of the weapon if it were not directed towards the ground or into a water tank. During warfare in the open country, and according to their favorite system of stratagems, the Germans have sometimes made use of this peculiarity and have lighted fires of wet grass, emitting steam, which suggested the presence of purely imaginary machine guns.

The Maxim uses a flexible canvas-belt with 250 cartridges. There is only one rate of fire, about 400 shots per minute.

The system of transportation is dif-

ferent from ours, as pack animals are never used; all the matériel is on a carriage; the machine gun, always set up, rests on a pedestal which slides into grooves either on a caisson or on an automobile. In the German Mercedes automobiles made in time of peace, the presence on the frame of nuts had been noticed. Nobody had been able to detect for what purpose, but we now know they were adapted for the transport of Maxims.

The machine-gun companies comprise as mounted personnel the officers and noncommissioned officers; besides, the caissons drawn by horses can proceed at the trot, carrying the gunners and leaving temporarily behind the ammunition carriers. We thus see that the German command intended to bring the machine guns as soon as possible into action, even, in case of need, ahead of their infantry.

In the fire zone, the machine, invariably set up on its mount, is transported either by a man on his shoulders (weight 55 kilos.) or by two men as a stretcher, or it may also be hauled on the ground by three servants. The curved forepart of the carriage gives it the aspect of a big insect and makes this progress possible, even on rough ground. To certain machines are adapted chains for the transport by men. It has been rather hastily inferred that the gunner was chained to his piece; the reality is simpler and not so dramatic.

However, some instances of this brutal method have been verified. During our combined offensive and when the wood of Fricourt had been carried by the English, a German gunner was found rivetted to his weapon by his foot and waist; he was dying from exhaustion and thirst, as he had been deprived of water for three days. In the bottom of a dugout, in the region of Gommecourt, the Tommies also discovered the body of a gunner chained to his piece by the wrist.

The Maxim only fires in the low position, about 50 centimeters above the ground, so as to obtain a sweeping fire on that level.

At the mobilization, the units of the numberless German machine guns were completely organized, either in regimental or in divisional companies. The lessons of the Balkanic wars, which had not been sufficiently studied in France, had shown that for the infantry the presence during the fighting of the machine guns is not only a powerful material help, but also a considerable moral support.

It is thus that the Germans began operations with thousands of machine guns. This weapon is perfectly suited to their temperament. Such an automatic arm corresponded to their immoderate love of machinery and to the mechanical training of their soldiers, such a murderous weapon was in harmany with their instinct for destruction, and finally, the machine gun was heralded as the weapon fit for surprise and treachery, two really German propensities.

At the opening of the war, the great number of their machine guns was one of the elements of their superiority. They excelled in the art of hiding them in ambush behind a wall, a hedge, or in a counterfeit straw-stack, with the muzzle masked so as to conceal the flash. Since then, the multiplication of these weapons has helped to supplement to a certain extent the waste of their human material.

The statistics of the spoil captured by the Allies on the Franco-English front showed, during the months of July and August, a proportion of one hostile machine gun taken for each one hundred prisoners made. During the great offensive action of September, this proportion has been more than double; it seems very high, as we are entitled to infer that, for each captured weapon, one or even more has been destroyed.

The increasing development of the number of machine guns appears to be a characteristic of the German defensive tactics, the line of these weapons constituting for their trenches a structural framework of elements getting constantly closer and closer.

Their carefully selected and methodically trained gunners have, from the beginning, been taught that their weapon is irresistible in the defensive; also, after having hurled death mechanically, scientifically, they are able to contemplate the destruction of human lives, a sight which is congenial to their hereditary instincts of slaughter. It is to be noted that the servant of no other weapon enjoys the same privilege. Neither the artilleryman who fires at long range, nor the aerial bombardier who drops his shells from a great height, is able to ascertain the effect of his action. The only fighters who might be assimilated to these machine gunners are the crew of a submarine, who, when the torpedo strikes its target, can look on the agony and death of their victims.

All these feelings concur to imbue the German machine gunners, all picked soldiers, with a special mentality and pride. When fighting, they display a real bravery and often an extraordinary stubbornness. Numbers of them have sworn to be killed rather than surrender and do not hesitate to massacre without pity the *kamarades* who attempt to go back on their word. At the English attack on Mametz the German machine gunners fought to the last; their trenches taken, they refused to surrender. On the other hand, these same soldiers display a savagery equal to their bravery when they direct a relentless fire on poor wounded men dragging themselves away along the ground.

It has been observed that the bravery, composure, audacity and cleverness of the German machine gunners form a striking contrast with the timidity and the frequent awkwardness of their bomb-throwers; the French and English grenade-throwers are generally very superior to the Teuton bombardiers, no doubt because machine guns are specially adapted to soldiers who are themselves machines, whilst the efficient use of hand weapons depends on the individual pluck of the men.

Still we must acknowledge that, as machine gunners, the Germans are past masters in their brutal art.

6. What is the tactical employment of these terrible weapons? At the beginning of the war, during the operations in the open country, we considered the machine guns as a *reserve of fire;* the sections were kept far back in the rear and only came in towards the end of the battle, having been ordered to the front niggardly and reluctantly. The German conception, as we discovered, was quite different.

Since that time, we have admitted that the machine guns are to be considered as a *cover* for the infantry at short and middle distances; they, in a manner, prolong the action of the artillery, although acting in quite a different

manner. Consequently, in order to support the progress of an attack, it is necessary to engage as soon as possible the greatest possible number of machine guns.

Still, besides these covering units, other units must advance as nearly as possible with the assailing troops and be ready to occupy the first carried position so as to support another advance of the infantry. It is a ticklish question to settle their proper place in the assault; they no doubt must enter into action as soon as possible, but it would not be safe to send them on with the first wave. Their real place seems to be behind the second or third wave.

When on the defensive, the machine guns ought not to be all stationed on the first line, whose exact location is too well registered by the enemy's artillery. It is better to station them in depth and rather on each salient so as to pour a flanking fire on the attacks. The German machines are almost always posted on a flank, a station which augments the effective part of the sheaf, and this is the best way to use them. The German prisoners often talk of *position machine guns* placed on fixed mounts and remaining independent of the machine-gun unit. For a long time the machine guns have been casemated under protected shelters, such as a block-house, armored cupolas, small forts; but at present there exists on both sides a tendency only to bring them into position at the moment of fighting and on the very parapet of the trench. During normal times the machine is carefully sheltered and only brought out in case of an attack. The building of projecting and always visible shelters is thus avoided; their situation is too easily registered and they are invariably struck and destroyed one day or another when shots are fired through the loophole, which also inconveniently restricts the field of fire. During the affair of Ville-aux-Bois, on the 25th of last April, our soldiers captured, 8 meters underground, several machine guns sheltered there, and which were to be brought up and down by a system of hoisting winches and inclined planes.

On the whole, the machine guns are mostly *in eclipse* and are characterized by their indiscernibility; only their bark unmasks them, and then only at the very moment when the assailant expects to capture the enemy's position—thus their effect of surprise.

The first teaching derived from the offensive on the Somme shows that the Germans apply this system in a most ingenious and methodical way. They try to keep their machine guns protected against the most violent bombardment and sometimes succeed, thanks to the depth of their dugouts. As soon as the enemy's artillery, lengthening its range, opens its barrier fire, the machine gunners hurriedly bring up their machines and station them without any cover on what remains of the parapet.

A noncommissioned Bavarian machine gunner, captured at la Boisselle in a sheltered holding twenty men, thus explained the orders he had received: "As soon as the enemy's infantry attacks, fire the mines which are kept ready; then come up to the surface, station your machine guns and fight to the very end."

In order to prevent the formidable smashing effects of heavy explosive shells, the Germans, untiring diggers and stubborn workers, have excavated in the whole region shelters of the most extraordinary resistance. Their higher command had established a new type in the model called *Zwei Gruppen* (two

groups), arranged for two groups of nine men, with reinforced walls and ceiling; the bottom was reached by sixteen steps of 24 centimeters or by ladders. This subterranean chamber was used as shelter for the machine gun and its crew. To lift the machine gun to the surface, usually by a system of ropes and pullies, only a few seconds are required by well-trained gunners.

Some of the latter have been seen, immediately after the explosion of a mine, stationing their weapon on the brink of the crater; others, when the first line of assailants had passed over their heads, riddled with their suddenly revived fire the rear of the attacking waves. Such effects of surprise caused serious losses to the English infantry in the neighborhood of the villages of Thiepval and Serre, demonstrating to our brave allies how necessary it is to "clean the trenches," an operation which they rather neglected owing to their traditional love of fair play.

But the more he dug himself into the ground, the more the enemy was compelled to perfect his elevatory system in order to bring up his guns without any loss of time. Thus in the château of Thiepval, which its defenders considered to be impregnable and which was nevertheless carried by our British allies on September 15, the latter discovered with astonishment an extraordinary installation of five lifts, powerful enough to bring up or lower the matériel and the men. This machinery explains how, notwithstanding a formidable artillery preparation, the first assaults were long held in check. Several times the assailants had experienced the deadly fire of the German machine guns popping up and down like "Punch in Punch and Judy," as depicted by an English war correspondent.

Whether it be a question of storming villages or intrenchments, the same danger is to be expected from machine guns that have escaped destruction either by good luck or owing to their special protection. In Mametz, in Montauban, in Fricourt, machine guns firing through the cellar windows caused terrible havoc in the British lines. The German organization of the village of Pozières, a village of about 400 inhabitants, and of its surroundings, comprised no less than 200 machine guns, of which about 30 remained intact after a destructive fire which had lasted two days and nights. The carrying of this formidable position was a splendid performance by the Australians, but they had to fight hand to hand four days and four nights with the utmost obstinacy. At each winding of the subterranean labyrinths of this village, Maxims were in ambush, pouring deadly enfilade fires through the underground passages; they had to be reduced one by one and their squads annihilated by grenades.

Unmasked at a short distance, these unapproachable machine guns, by their clamped, rapid and flanking fire, deliver exceedingly dense *rafales;* no living being caught within the compass of their sheaf has a chance to escape, and the attacking troops are swept away with a terrific suddenness. During the recent attack of Glinchy, Guillemont and Courcelette by our allies, and of Berny, Vermandovillers, and Deniécourt by our own men, these nests of machine guns, which here and there had remained intact, dreadfully hindered our progress. They sprang up served by picked gunners, diabolically, whose extreme stubbornness only enhanced the spirit of the assailants and the brilliancy of their victory. The experience of former encounters had proved that only plucky

parties of grenadiers stealing through the craters and shell-holes were able to subdue these obstinate gunners by a shower of bombs. All the same, this operation is arduous, often precarious, and always costly.

It is for this reason and in order to extirpate these nests of wasps, which the artillery had not succeeded in destroying from a distance, that the British army inaugurated the strange war machines, called *tanks*, whose apparition excited such curiosity. Officially denominated H. M. L. S. (His Majesty's Land Ships), these monsters have the aspect of gigantic tortoises, long, low, with a steel shell of a dusty color, contriving to progress on the most chaotic attacking ground, throwing down walls as a blow, crossing woods, wire entanglements and trenches, descending and ascertaining the slopes of a crater and specially destined to attack the enemy's machine guns. Some of these fantastic machines were seen at work against the château of Thiepval, steering straight towards the machine guns in action, smashing them and grinding down the crew. They have been depicted as formidable apocalyptical beasts, invulnerable, irresistible, their machine guns and light artillery pouring out death from all sides and spreading terror in the hostile lines. Such appeared in times of yore the elephants of Pyrrhus, impervious to swords and arrows, terrifying the Roman cohorts.

We witness the inauguration of new tactics, whose importance will steadily increase: a struggle between the mobile armored machine gun and the machine gun emplaced during action.[1]

Thus, on the defensive, the machine guns work in conjunction with the artillery, each having, however, a distinct objective. Whilst the former are entrusted with the task of stopping the storming waves, the latter directs on the space behind their rear the famous barrier fire, a dense screen of fire which forbids the approach of reserve troops or else destroys them.

Finally, whilst the bursting effect of the shells have a tendency to scatter human bodies about, instead of piling them in heaps, the accumulations of dead men mentioned after great operations are mostly caused by the sweeping fire of the machine guns in the masses of the assailants. The thick group of dead lying in certain narrow sectors clearly imprint on the ground itself the tragical stamp of their destructive activity.

We must not omit to mention a new tactical adaptation of this weapon, that of the aerial machine gun firing on an objective of infantry. One of the *communiqués* has commemorated the achievement of an aeroplane coming down to a height of 100 meters above a retiring line of German infantry and letting fly several deadly *rafales*. A few days later, an English aviator soaring at 300 meters enfiladed with the fire of his Lewis machine gun a party sheltered in a ditch along a high road and threw it into disorder. No doubt this is an

[1]The bringing to a working basis and practical application of the tanks are the work of Lieutenant Colonel Swinton; their development is due to an enterprising business man, Major Stern. It is curious to note that owing to the monopoly in matter of war machinery which the Germans arrogate to themselves, they have claimed this invention as coming from a German brain. The *Lokal Anzeiger* made this statement "in the interest of historical truth." According to this paper, a model of land cruiser had been elaborated in 1913 by a Koenigsberg civil engineer, named Goebel, the H. M. L. S. being only a pale copy of the latter.

exceptional application of the weapon to aerial tactics, but the opportunity will again turn up as soon as a favorable objective will disclose itself to our audacious flying fighters on the watch.[1]

But to make the field untenable by means of a destructive fire is not enough for the defense; the advance is also barred by a terrible and complicated barrier—the system of wire entanglement.

The use of an artificial obstacle to stop the advance of an attack is as ancient as the trench itself. Let us quote as an instance the classical *chevaux de frise* in use since the middle ages. With the improvement of the wire-drawing machines came the idea of applying to the art of war the resistance and malleability of iron wire, stretched as a fence or woven into an entanglement. Like the machine gun, the wire networks were first used in the War of Secession, during which the American generals were much given to digging entrenchments. In a country where wire was the only enclosure of immense cattle-raising estates, its use in the war was quite natural.

Later on, during the South African War, the Boers protected their trenches by means of wire entanglements fixed at a distance of about one hundred meters in front of the latter so as to obtain a *glacis;* the first wire elements were connected with petards which exploded when the wires were run against at night by enemy scouts.

It was more and more used during the war between Russia and Japan, as well in Manchuria as at the siege of Port Arthur. Its great resistance to artillery fire was ascertained and the conclusion reached that its destruction could only be effected by a great expenditure of shells and by a perfectly directed fire. The scantiness of their ammunition stores prevented the Japanese from adopting such a costly system; they were compelled to use wire nippers. When the Japanese approached Hill 203, the top and grassy slopes of which were the key to Post Arthur, they contrived to send volunteers dressed in green like beetles, who, creeping cautiously through the grass, reached and cut the wires.

The value of this accessory defense having been duly noticed, the lesson was immediately taken up by the Germans.

One of the principles of the German organization, applied by them as well to warfare as to their economic activity—including the development of the population—is that there never can be enough of a useful thing; it is their system of the colossal. In consequence, for the defense of the regions they had conquered, they did not stop when they had surrounded them by a gigantic moat, but covered its approaches from end to end with a formidable barrier of wire entanglement.

Let us imagine an ugly plantation of pickets of an average height of 60 centimeters planted as a quincunx at a distance of a few paces from each other, and connected backward and forward, up and down, by a network of simple or of barbed wire, the whole mass being as bristly, as winding, and as intricate as possible. If we consider the extreme tenacity or power of resistance of a single well-strung wire, we may conceive how painful will be the progress of a human being through his mon-

[1]One of the masters of "swivel chair" German tactics, Major Moraht, confesses it with melancholy: "Some English aviators," he writes in the *Berliner Tageblatt*, have directly attacked with their machine guns our troops both on the march and in position."

strous network, of which the prickly and crabbed meshes are so intricately interwoven that not even a cat could slip between them without being hurt.

All sorts and diameters of wire are made use of in the present war. On the Italian front, the access to some cave shelters hewn in the rocks was defended by wire as thick as the little finger; this wire was strung between posts made of tree trunks and cemented into the ground. Around Pozières, whose formidable organization we have noted, were found pieces of wire made of five barbed wires twisted together with sharp points. The French and German wires are very much the same. Some American firms sell equally these artificial brambles to ourselves and to our enemies, according to the practical habits of ultramarine business. As a consequence of the enormous consummation—the Western front alone stretches over 800 kilometers—the prices of the different sorts have increased from 50 to 150 per cent, a rise of course corresponding to the rise in the price of the steel material and of the zinc used for the galvanization. Before the war, ordinary wire and zinc were imported from Germany; the Germans thus do not run the risk of being left unprovided. We ourselves and our allies now get the necessary metal from the mines of Broken Hill in Australia and the mines of America.

In order to install a regular "entanglement," a series of short piles is driven as solidly as possible into the ground; timber being easily destroyed by artillery, it has sometimes been replaced by iron pickets, with loops in which to fix the wires. Their methodical establishment is only possible at some distance from the enemy, as the noise of the hammers, even when they are muffled, fatally gives warning to the enemy, whose eyes and ears are constantly upon the watch. Owing to the resulting necessity of working at night and sometimes under fire, the first line of entanglement is generally no more than an extemporization.

Here are used either unrolling spirals (Brun system) or *trébuchets* placed on a line and closely bound together. The latter are barbed-wire cages of polyhedron shape built at the rear on a framework of four wooden cross-pieces bound firmly together by wire; they are easily carried and put in place. When the adverse trenches are close to each other, the friendly and the hostile entanglements come in contact and make up a whole uninterrupted and indistinct conglomeration. The troop which initiates an attack must both open a gap in its own and destroy the opposite system.

Behind the first lines, the entanglements are generally stronger, as it has been possible to plant them scientifically, leisurely, and out of the reach of the enemy's vision, if not of his fire. This explains why very vigorously conducted assaults have sometimes been brought to a standstill, after a first success, by running against most powerful wire organizations only partially destroyed by the effects of the artillery. Protected by the topographical configuration, entanglements erected on a counter slope are a specially tricky and dangerous obstacle because invisible until reached by the storming party.

The Germans have many communication trenches with wire on both sides so as to meet a hostile encircling movement and to permit the defense in two opposite directions. Finally, in some of their trenches in the Somme, the bottom was found to be floored with oak

sleepers protected against wear and tear by very thick interlaced wire.

It has been remarked that in this system, with its extraordinary complication and entanglement of trenches, communication passages and tunnels inclosed in belts of obstacles, the garrison is, to a certain extent, a prisoner of its own fortification. To fly is almost impossible, for the soldier inevitably sticks to the bottom of his trench, where falling back through narrow zigzags can only be effected man by man and with an extreme slowness. The whole can thus be defended by troops of indifferent quality, and we easily understand why such an organization originated in the heads of an army whose best elements had been swept away during operations in the open country.

In any case, the manifold combinations possible for constructing treacherous man-traps in the pathway of the assailant, thanks to the elasticity and resistance of wire, have been applied by the Germans with a marvelous ability. In front of natural strongholds, as well as in front of wholly artificial entrenchments, they excel in the art of covering their approaches by tortuous and bristling entanglements of barbed wire. A striking example is afforded by the Bois des Trônes, which was carried by our English friends after four days of bloody hand-to-hand fighting from tree to tree. It looked as if it had been put in a state of defense by gang of poachers; its whole area was found to be one nest of fearful man-traps, with steel nooses and cobwebs in thick wire fixed to the trees and twisted in with the roots. Already, during their first victorious advance, the English had noted with astonishment that some of the trenches on the *twentieth* line were protected by wires, amongst a fantastic entanglement of *boyaux* and saps, as compact as the ramification of a star of hoar frost.

One can easily imagine the exertion of dangers and sacrifices necessary to break through these terrible enclosures.

These invincible obstacles to the progress of infantry must consequently be destroyed before any attack is launched. At the very least, breaches and passages must be opened. This may be done by groups of men creeping towards the network to cut the wire or to lay strings of petards which are afterwards exploded from a distance; both methods are very dangerous so close to the enemy's fire. And even when cut, the bits of wire remain lying on the ground and are a serious and more or less dangerous obstacle, for an ordinary prick may by infection develop into a grievous wound.

We have stated that the fire of a clamped machine gun may break the wires, but it only opens a narrow gap.

Some attempts have also been made with a grapnel thrown from the attack trench by a life-saver's cannon; it is attached to a steel cable, which is then hauled back by a winch. But, besides not being easy to install, it happens that the winch yields; the cable may snap or the grapnel, raking up the loose wire, pulls it back on the very parapet of the trench in a mass of tightly agglutinated metal, which forms a new obstacle. Besides, this system can only be applied to entanglements within reach of the first line.

All these systems give only indifferent results. The only efficient method of destruction of wire entanglement resides in the repeated use of explosive shells without delay action fuses, and with a fire perfectly laid. In this case

the posts are hacked to pieces, the metal fragments pulverized; it accomplishes an excellent clearing, but with a heavy consumption of projectiles. This last consideration does not, however, count for much nowadays. Nevertheless, however searching may have been the effect of the fire, it seldom occurs that the whole of the front to be attacked has been thoroughly cleared, and behind the first line of assailants, the next following waves are accompanied by men carrying wire nippers who cut the wires remaining intact. For this clearing operation the British fusiliers adapt to the end of their rifles a sort of fork, with two flat and sharp-edged prongs strong enough to cut and to remove ordinary wire.

During their victorious offensive on the Isonzo the Italians seem to have inaugurated a new system. The wires are no longer destroyed by a long-range fire effected without seeing the target, but a direct fire from another extremely powerful weapon, the trench mortar.

Launching enormous high explosive shells at a distance of some hundred meters, this trench artillery has realized most extraordinary effects; the results went beyond every expectation. Against the bridge-head of Gorizia and the accessory defenses of the Carso, the trench mortars cleared completely in a few hours all the entanglements on a wide space of ground. The British army also uses large spherical bombs, filled with several kilos of explosives and vulgarly called "plum-puddings." Launched by *mortars d'accompagnement*, their high-angle fire successfully destroys the wires planted on a counter-slope.

Electrification of the wire entanglement has also been tried and, it is said, even locally realized by the Germans, who are known to be great experimenters of electric appliances, but serious practical trouble arises from the loss of current on the points of contact with the soil, a loss which it is almost impossible to prevent.

It is clear that such a treacherous and perfidious system constitutes, with the machine gun, a weapon of surprise, a cunning combination especially attractive to the tricky and bloodthirsty tendencies which characterize the German mentality. . . .

9. Such is now the tactical use of wire, but the Germans do not stop there; they have *strategically* used its obstructive power, mostly on the Russian front, where enormous spaces bristling with pickets and artificial brambles have allowed the moving of forces from one part of the immense battlefield to another. The development of the railways would not have been sufficient to facilitate these movements if they had not been able to execute them without risk to the fronts stripped of their troops. Here began the strategic mission of the wire entanglement, of which an example is here cited.

In the region of Warsaw, the Russian and German armies stood for months confronting each other along the small rivers, the Bzara and the Ravka, on a line of 60 kilometers, the normal defense of which would have required from six to eight army corps. It was discovered since that such a space was only occupied by some groups of a thousand men stationed at distances of 8 to 10 kilometers, furnished with an enormous number of machine guns and protected by immense fields of barbed wire, which in several places extended 6 kilometers in depth and was fixed to posts 6 feet high. The formidable power of resistance of such a barrier

is easy to imagine. According to this method of economizing men on certain points by a substitution of material, the covering of strategical movements by barbed wire in 1915 enabled the Germans to acquire on other points, considered by themselves as decisive, a numerical superiority even over the immense armies of Russia.

10. Machine guns and wire—what a formidable combination of machinery opposing iron and fire to the most determined offensive! As long as the terrific weapons are not muzzled, as long as the entanglements are not crushed and destroyed, every attack which encounters them on its way is doomed to a bloody defeat. The assailing waves are broken and hurled back, and any troop which ventures in the meshes of the entanglement remains caught, hooked, mauled and torn by the inextricable and unrelenting brambles. If at that moment the hitherto silent machine guns begin barking, one of the most tragical war sights is displayed—the sight of a line of men destroyed in a few seconds, literally mowed down, as the English say, as if a gigantic bloody scythe had swept the surface of the soil. Wounded in the legs by the sweeping fire, the fallen soldiers are then shot through the body—hence the bodies riddled with bullets—unless they are lucky enough to tumble down into a providential all-saving shell-hole. The artillery also executes sweeping fire, but explosive shells act against the personnel rather like the blows of innumerable axes. Their effect is more dramatic; it scatters about heads, arms and legs pulverizing or tearing the human body to pieces. If we dare say so, the work of the machine gun is neater and not so gory, but no less relentless, and perhaps more murderous.

There is no infantry chief, leader of men, whose heart does not stop with the most tragic anguish when, seeing his troop stopped before intact entanglements, he hears break loose the awful tick-tack of these clocks of death, every stroke of which sounds the dirge of a beloved human being.

Nevertheless, when the entanglements have been overthrown, the wire annihilated, the machine guns muzzled, the task of the assailing infantry is not yet fulfilled. Its progress will continue arduous on a rugged and chaotic ground, which looks as if it had been upheaved by a cataclysm or as if it were a lunar landscape dotted with holes and craters; a ground broken up, cleft by crevices, broken and furrowed like the billows of the sea, littered with innumerable fragments of timber, steel, broken weapons, scattered pieces of equipment, bleeding human members—*"disjecta membra"*—of crucified corpses, many of which, weird apparitions, remain dangling from the barbed wire!

Land of a tragic grandeur and of a sublime horror, which only a Victor Hugo could describe. . . .

11. Thus one of the elements which mostly contributes to make this war so long, the defensives so obstinate, the offensives so bloody, is the combination of machine guns and wire. More than heavy artillery, it is this combination which delays or stops the best prepared, the most carefully led attacks.

However, if the Germans got ahead of us by the adoption of this machinery, we have known how to overtake them. Our machine guns reply shot for shot to theirs and our gunners are as clever, as brave, and as stubborn as the servants of the German Maxims.

For months epic Verdun has proclaimed of what our men and our

weapons are capable on the defensive. "Our machine-gun and 'barrage' fires have stopped dead the attacks of the enemy, who has left heaps of dead bodies on the field;" thus runs the admirable and comforting monotony of our *communiqués!"*

A semiofficial report has recently mentioned a famous section, that of Adjutant J., who remains gloriously anonymous. Since the opening of the campaign, this brave man has served the same two machine-guns; one has been christened "Without Fear," and the other "The Terror of the Boches." They have made themselves renowned in Belgium, at Sedan, at La Fère-Champehoise, before Rheims, at La Boisselle, at Hébuterne, at Tahure, and finally before Verdun, where, buried by a terrific heavy caliber bombardment, they were for a short time compulsorily abandoned by the squad. But the latter reconquered the emplacement with hand grenades, repulsed the assailants, unearthed the guns, and put them again into action with great damage to the Boches.

Our enemies themselves have acknowledged the efficacy of our machine guns and the bravery of their personnel. In March, 1915, the Kaiser promised a prize of 700 marks to the German soldier who should capture a French machine gun, showing thus the value he attached to the capture. And recently a war correspondent of the Leipzig *"Latest News"* related an impressive episode of the great battle before Verdun:

Two German battalions which were progressing through the western part of the wood *"des Caures"* found themselves suddenly stopped before the second line of defense by a brave French officer, who, alone, shut up in a blockhouse with his machine gun, was uninterruptedly firing on the German infantry. As even with hand grenades the latter could not succeed in silencing this obstinate fighter, flame projectors had to be used to stop his fire, which held in check two entire battalions.

The machine gunners of our brave English allies emulate the hardiness and bravery of our own. Let us quote as an example a squad of South Africans who used Lewis machine guns during the attack of the wood of Delville. The only survivor of the whole personnel went on firing with the utmost calm when a jam suddenly occurred; as cool "as a cucumber," so runs the report, he practically dismounted his weapon, readjusted the mechanism and put it again into action until he had exhausted his last cartridge; then only he retired, carrying away his machine. During the last stage of the attack of this famous wood, there was a furious fight of machine guns firing against each other, and in the space of twelve hours a total of 999,500 cartridges was consumed by the Lewis machines.

A report found on a German officer captured at Thiepval appreciates the British gunners as follows: "The British infantry is extraordinarily tenacious on the defensive; it is an extremely arduous task to dislodge even the smallest fraction, when once they have with their machine guns established a footing in the corner of a wood or in a group of houses."

Finally, however strong and complicated the German defensive organizations may be, we have, more than once, proved that we know how to overcome and carry them. Already in 1915 the glorious names of Carency, of Notre Dame de Lorette, of the Labyrinth,

which were real dens of machine guns crouched behind fields of wire, testify to our ability. It is to be remembered that one of the great leaders of the French offensive on the Somme, General Fayolle, was also the conqueror of Carency, that village of Artois put into such a thoroughly scientific state of defense that its capture in three days by a methodical encircling is considered as a model and threw the German staff into a state of extreme stupefaction. Since then, and before Verdun, our infantry has shown that it knows how to stand up against deadly *rafales* and to charge and take machine guns. This was brilliantly demonstrated by a glorious episode, whose hero was a modest officer of the reserve, Lieutenant Le Picard, one of the rare foot-soldiers in whose favor the high command has dropped the inflexible regulation of not publishing names!

He requested and obtained permission to retake a trench which had been lost and where the Germans had installed a machine gun. His pipe in his mouth and a stick in his hand, the lieutenant opened the march with magnificent bravery, shouting: "Forward, my boys, let us charge like musketeers!" Just on the parapet of the position, he fell struck to death by six bullets, but his men jumped on the gunners and made short work of all of them; the lost trench was thus recaptured. On the Somme, it is with the same irresistible dash that our own and our allied infantry affront and master the most formidable machinery. In the vast agglomeration of Combles, which was at the same time an arsenal and a fortress, each house was a redoubt, each cellar an ambush of machine guns. Several sections of picked German gunners were there caught in their catacombs.

The village of Thiepval, held by the Wurtemberger pioneers for two years and called by them the "Wonder Work," had been transformed into an underground fortress whose cellars, carefully reinforced, were extended out through the chalk by radiating galleries, all enfiladed by machine guns.

Thiepval and Combles fell, as had fallen Carency and Lorette; these splendid feats of arms herald other more decisive victories.

Thus during a series of partial but magnificently victorious offensives, we have gathered valuable lessons for the great operations of the future. We, no doubt, have had to submit to heavy sacrifices, but it has been said by a philosopher that experience is a trophy composed of all the weapons that have wounded us. We now realize that the protracted, precise, unrelenting and complete employment of the most powerful means of destruction is required to prepare the forward march of our impatient infantry, to destroy the machine guns and to annihilate the German wire. Carefully collected, deeply meditated, these teachings are now applied in our operations on the Somme, where only a minimum of losses has been exacted for each of our successes. It is this saving of French lives which enables us to pursue with a long and patient effort the already victoriously developing stages of a battle which may be decisive.

Let us trust that when the day of the great push comes, our fervid pursuit may be so rapid that the enemy will have no time left for the erection of these hideous barriers. Let us foster in our hearts the firm hope that soon the barbed wire will only be used as a formidable enclosure for the chained monster, finally reduced to impotence.

Field Fortification

Organization of Intrenched Zones

FOURTH LECTURE

1. *General Principles, Definitions.* The organization of an intrenched zone comprises the establishment of elements of *frontal fire* and of *flank fire*, sweeping effectively the terrain.

These *elements of fire* take advantage of the natural accidents of the terrain: woods, houses, inhabited places.

The *elements of fire* are occupied by fixed garrisons designated by the commander whose strength varies with circumstances.

The group unit is generally the *platoon*, at the minimum a section.

Successive lines of elements of fire are established in rear of the first line, so that they may come into service as soon as the first line falls.

Hence elements of fire must be established in *breadth* and *depth*.

2. *Organization in Width—Strong Points.*—Group of elements of fire, so arranged that by their reciprocal support they will permit the defender to stop the assailant. The strong point is surrounded by a continuous obstacle, and may contain a redoubt.

It is always occupied by a constituted unit, commanded by its chief, who is held responsible for the constant repair and improvement of the defensive works, and of the defense of the place to a *finish*. The strength of this unit will depend on the importance of the strong points; it will generally be a company or a fraction of a company.

The strong points will be distributed along the front (width) according to the importance of the portions of terrain to be held and the facilities of assuring flanking dispositions.

3. *Organization in Depth.*—Fire power alone will not be always sufficient to assure the defense of a position; the defensive system must be organized so as to provide for immediate counter attacks, intended to retake all or a part of the last position. To this end, it is necessary to have:

(1) In rear of the first line of strong points, other strong points intended to limit any success of the enemy.

(2) Troops in reserve intended for counter attacking.

4. *Organization in Width and Depth —Supporting Points.*—The strong points are therefore grouped in width and depth. These groups take the name of *supporting points*. Their defense will be entrusted to a fraction (battalion or group of companies) placed under one commander, who will furnish the garrison of the different strong points and the reserve troops. Artillery may be allotted to certain supporting points.

The supporting point is surrounded and partitioned by systems of barb wire; it always has a redoubt, made up of one or two strong points.

The necessity of establishing as many as possible *continuous lines of trenches* has been demonstrated by the war and consecrated by the Battle of Verdun. The isolated strong points, separated by uncovered or almost uncovered intervals, are easily located by aerial photography and become, during the

preparation of an attack, the favorite targets for artillery. Moreover, the absence of continuous lines prevents the rapid occupation of the intervals by the defenders and permits the enemy to filter in between the strong points.

The continuous line does not suppress the strong point, but the latter must be sunk in a network of trenches, zigzags and false or dummy trenches.

5. *Sector.*—The union of several supporting points under the same command forms a sector. Each sector disposes always of its own reserves distinct from those of the supporting points. It has generally some artillery.

6. *First, Second, Third Positions.*—The first position of a defensive organization then consists of a line of supporting points. In war a second position will always be organized, and, when necessary, a third, constructed as the others. The distance between these positions must not be less than from 1 to 2 kilometers. It may even be greater when circumstances demand.

Each position comprises several lines united by numerous zigzags and partitioned by wire entanglement. Arrange in the entanglements of the second and third lines passages which will allow movement of the reserves (reinforcement, counter-attack).

Part I

Trace of the Firing Line

7. The first thought must be given to creating a powerful front by installing a solid fire line. Its trace, resulting from the emplacement and orientation of each element, must satisfy successively the following conditions:

(1) Organization of flanking dispositions.

(2) Installation of accessory defenses.

(3) Simultaneously: (*a*) Rectification of the trace of the position; (*b*) search for and installation of observations; (*c*) construction of trenches; (*d*) clearing up and range finding of the field of fire.

(4) Construction of communications.

(5) Construction of shelters and incessant reinforcement of trenches, shelters and observatories.

8. *Organization of Flanking Dispositions.*—A firing line is defended better by flank fire than by direct fire.

The near flanking dispositions must be carefully and methodically studied, as soon as a position is chosen. These flanking dispositions are organized in such a way:

(1) That they cannot possibly fire into their own line.

(2) That they are as much as possible sheltered from frontal sight and fire of the enemy.

9. *The Machine Gun Is the Flanking Arm.*—The majority of the machine guns with their personnel are placed in shelters, in very deep saps. At the end of the bombardment the men bring out the piece and set it up on the emplacement, if it still exists, or along the trench parapet, unprotected.

Examples of flanking dispositions suitable to each element: (*a*) In the first place, the trenches are broken in trace so as to adapt them as much as possible to the terrain, while flanking each other mutually.

Fig. 1 gives a scheme of ensemble of a broken trace.

A careful examination of the figure indicates very clearly the ensemble of the flanking dispositions.

FIG. 1.—Scheme of ensemble of broken trace.

Fig. 2 gives some details of organization of the flanking arrangements. The machine guns *M* and *M'* are sheltered from direct view and fire by epaulements. The normal wire entanglement is interrupted in their sector of fire, and a low entanglement is installed there, which will not be cut down by their fire.

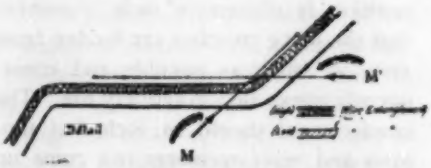


FIG. 2.—Flanking arrangements (details).

(*b*) Small salients (Fig. 3) are frequently and advantageously employed.

This "forward traverse" (Fig. 3) must be, at least, 6 meters in thickness at the base (along the trench), 4 meters at the top. The lateral branches are 4 meters long. The branches forming a redan are each 2 meters long. There can then be made a passage in rear to facilitate movement. The fire trench of the salient must be very narrow (2 feet 8 inches).

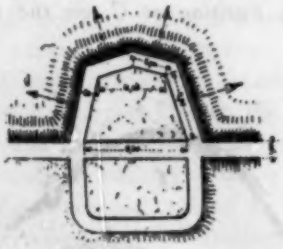


FIG. 3.—Small salient or forward traverse.

(*c*) From the position, short standing trenches are carefully constructed, sheltered by a strong parados against the fire of the neighboring elements of the general fire trench.

Flanking detachments are installed in these trench elements (Fig. 4).

FIG. 4.—Element of forward trench.

(*d*) The terrain may require the establishment of special advanced organizations. These positions are occupied by groups of firers.

An approach trench connects the arrangement with the first line trench (Fig. 5).

FIG. 5.—Special advanced organized position.

(*e*) It may be necessary to push a special trench element forward, so as to sweep a ravine, a valley, or a depression of the ground which cannot be seen from the first line. The approach

FIG. 6.—Element of forward trench.

trench of this position will serve for flanking a part of the principal front (Fig. 6).

(*f*) Finally, in woods, it will be logical to adopt the tenaille trace (Fig. 7).

FIG. 7.—Tenaille trace in woods.

The positions will be selected so as to be invisible through the woods and from aircraft above.

(*g*) From center to center the flank fire is assured by the installation of flanking detachments in effective emplacements. The flanks of each trench should not be covered by any other. Each should be solidly supported on its flanks so as to avoid enfilade fire and being turned.

Establish liaison by rifle fire and communications by defensive approach trenches, with neighboring organizations to right and left.

(*h*) Finally, so far as the artillery is concerned, the batteries from the beginning must be placed relatively far forward; it is only from advanced positions that artillery can possibly give a flanking fire for neighboring sectors.

(*i*) If in the night installation of positions the broken trace lines cannot be obtained, flank fire may be obtained, after building the trenches, by sapping outstanding trenches. However, take care that the enemy may not be able to enfilade them.

10. *Construction of Accessory Defenses.*—Infantry, of good morale, can repulse all attacks if it has a good field of fire of 50 meters in depth and if the progress of the enemy is retarded by accessory defenses.

(NOTE.—The construction, installation and destruction of accessory defenses are the objects of special lessons.)

Commence by putting down the entanglement the farthest away so as to prevent the use of flame projectors. Use the counter slope a great deal, the low places, woods.

11. *Simultaneously*—(*a*) *rectification of the trace of the position.*—Under the protection of the fire of the first line which has dug in when it was forced to stop, the emplacement of the position is chosen in such a manner that the firing trenches are hidden from view as much as possible and consequently unexposed to artillery fire. The emplacement should be such that supplies and reinforcements can come up under cover.

The different solutions which take into account at the same time the field of fire and cover, present each advantages and inconveniences.

Take two crests *XY* of considerable relief, separated by a valley *V* (Fig. 8).

(1) *Position at the foot of the slope at B.*—Good field for sweeping fire, emplacement hidden from artillery *M*, but dominated by the enemy at *K*; moreover, the movements of reinforcements from the crest will be difficult.

(2) *Position at C, on the military*

FIG. 8.—Emplacement of defensive positions.

crest.—Good commanding position. Good fire effect, sweeping on *CB*, plunging on *BPK*.

But the hostile artillery will regulate easily its fire on *C;* the movements on *DC* will be difficult; the trenches inclined on the slope will be very vulnerable, solution sometimes imposed by reason of the long views. It is always indicated for advanced combat posts. The installation of a line of surveillance or of machine guns could come from behind the crest by saps pushed under the crest.

(3) *Position at D on the real or topographical crest.*—Good views on distant debouching points *NKE*. Easy to hide if care is taken to place the trenches at 30 or 40 meters in front of the crest to avoid outlining the parapet against the sky.

Movements to the rear easy and hidden from sight. Very easy solution in moderately undulating ground. In rough country, the slope *CD* being very steep and short, the topographical crest presents the same difficulties as the military crest.

(4) *Position at E, on counter slope.*—Possesses a very short field of fire, is dominated by the terrain in front, but offers a considerable advantage; it is completely sheltered from view and from infantry fire. Hard to locate, and so little exposed to artillery fire.

The friendly artillery on the contrary can lend, by barrage fire on the crest, considerable and accurate support to the intrenched infantry; on the other hand, the enemy debouching from the crest, received by the fusillade and stopped by the wires, hidden from sight by the counter slope, undergoes a considerable effect of surprise, which is all the more demoralizing for that reason.

These trenches on the counter slope lend themselves admirably to close combat. Occupied by defenders of solid morale, protected by thick accessory defenses, they permit of stubborn and long drawn out resistance, even when held by weak effectives. The counter attack, launched at the moment when the enemy, surprised, stops, hesitating, against the entanglement, will have sure results. With this arrangement, a line of surveillance must necessarily be placed at *C*. Machine guns placed on this line, and capable of circulating on cover between *C* and *E*, will produce very powerful and deadly effect.

The advantages of organized positions on counter slopes have been consecrated by the war and particularly by the defense of the advanced positions before Verdun. Their advantages may be summed up by quoting Col. Piaron de Montdésir:

> Formerly, with arms of short life, and slow loading, it was necessary to have a range long enough to permit reloading. This reason no longer exists. Modern arms have a long range and load quickly, several shots being introduced at a time, thanks to the magazine. Long range fire may be utilized by the advanced combat posts and caponier trenches. It suffices to utilize rapidity of fire to obtain by the factor time what used to be obtained by the factor distance. Moreover, the effects of fire at short range are much more sure. The fire would not be good if the riflemen were subjected to the neutralizing fire of artillery, but, having escaped this, and only receiving a fire which they oppose by their own, their cover gives them a marked advantage. (Col. Piaron de Montdésir: "Essay on the tactical employment of field fortifications.")

(*a*) *Choice of emplacement.*—The importance of a free and extended field of fire is secondary to that of the infantry, being sooner in its combat position; a position, excellent for intrenchment, may have a limited field of fire. If the frontal accessory defenses are solid, a field of fire of from 200 to 50 yards and even less (30 yards in Argonne) is sufficient. A commanding position, chosen so as to obtain an extended field of fire—for example on the slopes of a line of heights facing the enemy—is generally to be avoided.

It is of the greatest importance that the fire trenches should be hidden from sight as much as possible, and, consequently, exposed as little as possible to artillery fire. Access should be possible under cover. Therefore it is recommended, in open country, instead of placing fire trenches forward of the crest, to place them somewhat in rear of the crest.

The infantry, then, in the choice of its positions, is considerably more independent than formerly. Only, it absolutely must seize the parts of the terrain which serve for the observation by the friendly artillery.

(*b*) *Search for observatories.*—The search for emplacements which give good views over the hostile position is of the highest importance. Flank views are particularly interesting. Observatories provided with means of optical and telephonic communication will be installed in trees, ruins of houses, straw stacks, and on all elevated points giving wide views.

If there are, forward of the position, points which permit the enemy observers to see into the friendly position and in rear of it, an effort must be made to find out whether, from the advanced positions, these points can be taken under an effective fire. The possession of cover in advanced terrains, such as houses, mills, which protect the hostile artillery observers, must be disputed desperately.

(*c*) *Construction of trenches.*—The trenches along the trace staked out are constructed according to the principles explained in a former lecture. The workers are hidden from distant sight by a parapet mask made of branches and brush. The work is done simultaneously with the range finding and the clearing up of the field of fire.

(*d*) *Clearing up and range finding of field of fire.*—The clearing up consists in removing or levelling crops, brush, small walls, houses even, to facilitate direct and flank fire.

A field of fire is *range-found* when fire can be opened with the exact sight setting, or visible objects in it. Employ, for range finding, observation by avion, reconnaissance by range finding parties. Use carefully and rapidly the information obtained. In woods, remove to the height of a man the bark of the trees in the field of fire on the side toward the friendly position. Whitewash this face. In this way, at night, the visibility of attacks or hostile patrols is augmented.

12. *Construction of Communications.*—Every defensively organized position must be provided with organs of communication, which will allow the rapid upbringing of supplies and reinforcement which, covered from distant view, is effected either by following defiladed routes, or by the way of the approaches, where trace, construction and arrangement have previously been treated. The number of these approaches will be de-

termined in Part IV of the present lecture.

13. *Creation of Shelters and Reinforcement of Works.* — Create, for troops of the line of fire, combat shelters on this line, and for the available troops and the reinforcements deep solid shelters in deep saps, with defiladed communication towards the rear.

Part II

Element of Platoon or Section Trench and Group of Elements of Trench

14. Groups of trenches are generally constructed for one company. They are composed of platoon trenches, or section trenches, whose intervals are connected by observation approach trenches with fire crests (defensive approaches).

The group of several elements of platoon or section trench will constitute a company group.

15. *Platoon or Section Trench.*—It will be built generally, and exception made of flanking dispositions already indicated, in the form of a flattened lunette, having approximately *50 meters of trench available for fire.* (Fig. 9.)

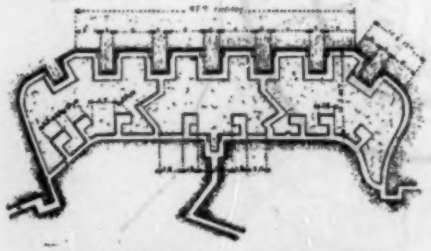


Fig. 9.—Element of platoon trench.

Distance between traverses, 6 to 9 meters, which may in exposed places be reduced to 4 or 5 meters, 2 to 4 meters thick at the top. The total length of the front of the trench, with 5 traverses in front (every 6 meters) and one traverse on each flank, will be about 70 meters.

The length of the excavation will be from 85 to 90 meters.

The face, or front, properly speaking, with its five traverses, will have a total front of about 45 meters (32 meters of fire crest). Each flank will have from 10 to 12 meters of development, including a traverse of 3 meters.

Do not place traverses at the salients. Stake out the traverses adjoining a salient at from 3 to 5 meters from it.

The section trench will have the half of the development of the platoon trench, but will comprise the same elements.

16. *Group of Trenches for a Company.*—The platoon trenches will communicate (Fig. 10):

(*a*) *Between themselves:* by means of the approach trenches of surveillance, prepared as a defensive approach.

(*b*) With the rear and the command post of the captain, by the approaches.

The trenches of the different companies communicate with each other at first only by the rear, then lateral communications are established, and these are prepared as defensive approaches. A continuous line of trench is thus established along the whole front.

The development of the 4 platoons may occur when the battalion reserve, situated 200 or 300 meters in rear, may make its action felt rapidly; if not, the company field work comprises but three trenches in the first line.

17. *Group of Trenches for a Battalion.* (Fig. 11.)

18. *Group of Trenches for a Regiment.* (Fig. 12.)

19. *Group of Trenches for a Brigade.* (Fig. 13.)

Part III

Plan for the Organization of a Supporting Point

20. The organization of a supporting point is, in each particular case, a problem whose data may, and whose solution will, depend on the military situation, the terrain, the time, the workers and material available, etc. No precise rules of organization can be given, but only guiding principles. These principles are outlined in the figures representing the organization of works for a company, a battalion, a regiment, and a brigade. (Figs. 10 to 13.)

The organization comprises the establishment of successive lines of defense, the permanent installation in these lines of fractions intended to assure its defense, or to constitute counter-attack troops; it comprises finally the largest use of approaches, shelters, wire entanglement, platforms and shelters for machine guns and trench weapons, so as to limit the enemy's advance and to retake, by counter attack, the ground lost.

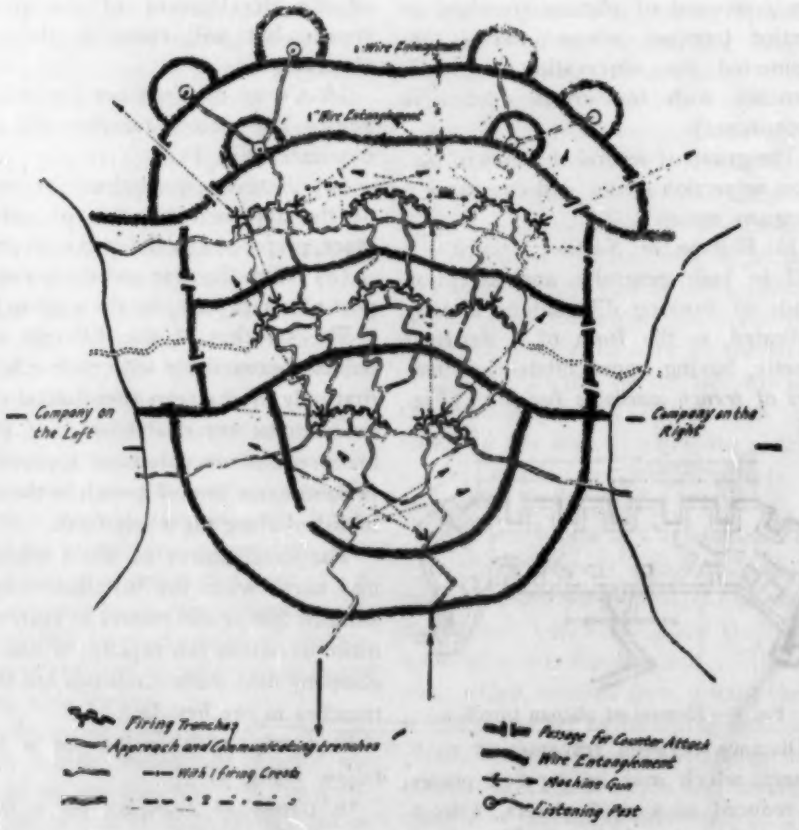


Fig. 10.—Group of trenches for a company.

21. *Successive Lines of Defense.*—The successive lines of trench bear the following names:

(1) Firing trenches.
(2) Support trenches.
(3) Intermediary trenches.
(4) Reserve trenches.

22. *Firing Trench.*—It is the emplacement where the advanced fractions receive the first shock. They permit the garrison to utilize, to a maximum, its force of resistance and to weaken the enemy considerably so as to prepare the counter attack.

They are sometimes double. This method permits an immediate counter attack, and in case of intense bombardment, a rapid retreat of the garrison, which, however, is held near. This trench is called the cover. It is generally at about 40 meters from the first line.

The firing trenches, covered by a large zone of accessory defenses, must be preceded by advanced post trenches, or at least rifleman's pits, likewise pro-

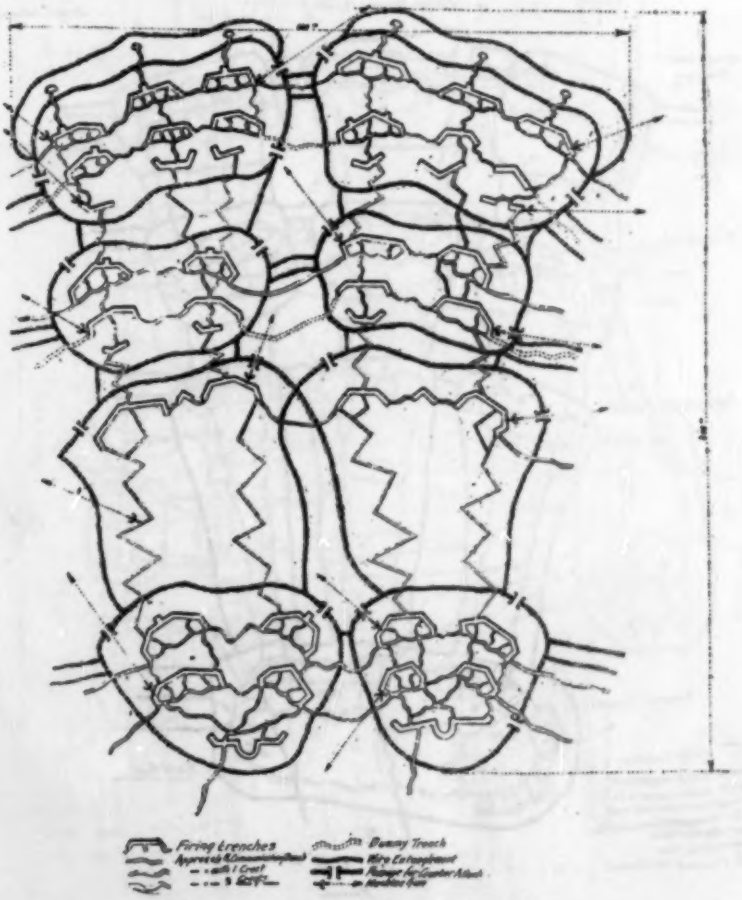


FIG. 11.—Group of trenches for a battalion.

tected by accessory defenses. These intrenchments permit:

(*a*) To watch over the accessory defenses, and to hold at a distance the observers and the hostile sharpshooters.

(*b*) To prepare, by assuring the advanced surveillance of the terrain, the task of the patrols and sudden enterprises, which assure the mastery of the terrain.

(*c*) In case of attack, to oppose to the enemy a first resistance. They assure thus the opening up of the flank fire, and they give the commanding officers the necessary time to prepare and spring the counter attack before the first line is reached.

23. *Support Trenches.*—The line of the support trenches will be established at from 100 to 200 meters in rear of the

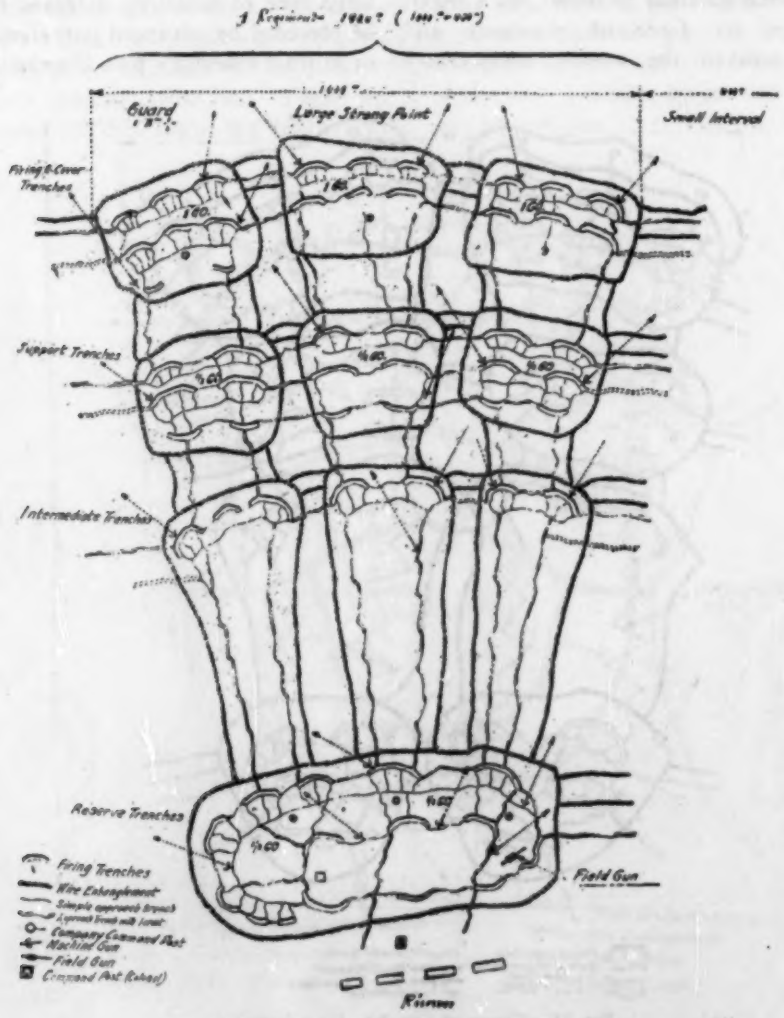


FIG. 12.—Group of trenches for a regiment.

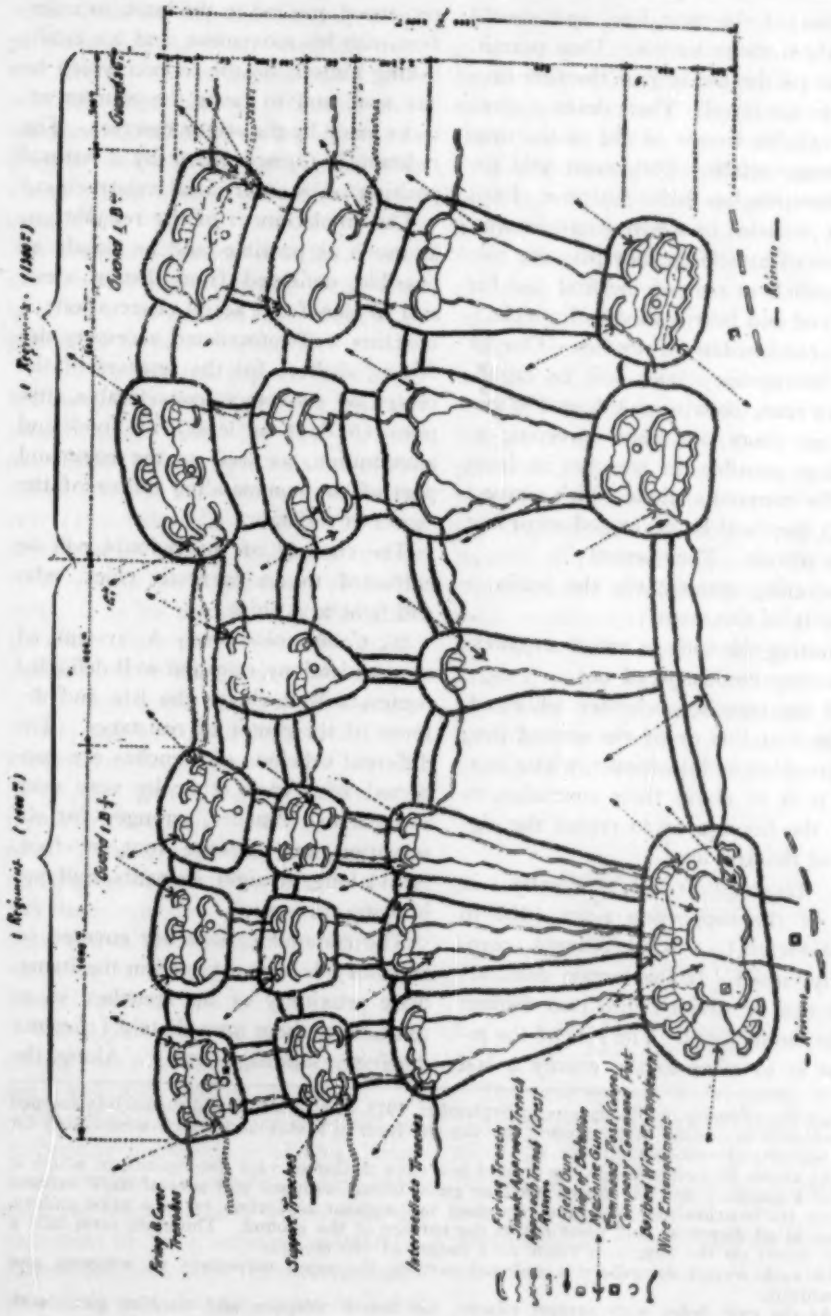


FIG. 13.—Group of trenches for a brigade.

trenches of the first line, and should hold them under its fire. They permit, in case of the yielding of the first line, to limit the recoil. Their defense gives the available troops of the sector time to counter attack. They must hold the first line trenches under their fire. Each one is preceded by a wire entanglement. In case of attacking, they play the rôle of parallels in rear of the first line for the third and fourth waves of attack.

24. *Intermediary Trenches.*—One or two intermediary lines will be organized in rear, likewise at 150 or 200 meters one from the other, sweeping as much as possible the trenches in front and the communications which connect them; they will be developed according to the terrain. They permit:

Sheltering momentarily the available elements of the sector;

Limiting the zone in which an entering enemy could spread out.

All the trenches, whether advanced, of the first line or of the second line, are provided with look-outs, whose mission it is to alarm their comrades, to start the barrage or to repeat the signals of the first line.

25. *Reserve Trench.*—Finally, in rear of the supporting point (400 to 1,000 meters), a solid redoubt, completely closed. If the terrain demands it, it can be divided into two distinct works, both closed. The rôle of the redoubt is to offer to the enemy a last resistance, pushed to the limit, to interfere with his movement and his establishing himself on the terrain which he has won, and to favor the counter attacks made by the sector reserves. The redoubt is formed either by a natural position or by an artificial construction.[1]

The emplacement of the redoubts is, as much as possible and as closely as possible, defiladed from distant view, and hidden from aerial observation; it contains well-constructed accessory defenses, shelters for the reserves of the center of resistance, considerable supplies (5 days at least) of food and ammunition, as well as the command post of the commanding officer of the center of resistance.

The custody of the redoubt will be entrusted to an energetic chief, who will fight to a finish.

26. *Communications.*—A system of communications, easy and well-defiladed routes, will facilitate the life and defense of the center of resistance. The different echelons of trenches are connected with each other by very deep and narrow trenches, arranged for observation and defense foot by foot. Avoid long, straight elements, and put in many traverses.

The communications are covered by accessory defenses, placed in the immediate proximity of the trenches so as to obstruct them immediately (*chevaux de frise,* sandbags, etc.). Along the

[1]In the offensive in Champagne in September, 1915, the French found themselves stopped by redoubts organized under ground, having the form of a star and which were called for that reason *star* redoubts.

At about 10 meters below the ground is a cave shelter of vast dimensions, in which is lodged a company and are stored machine guns, trench weapons and several days' rations. Five or six trenches executed by a very deep sap, without any relief, or by a mine gallery, radiate in all directions and come out at the surface of the ground. The exits form half a dozen points on the imaginary circle of a radius of 100 meters.

In each trench or gallery a railroad permits the rapid movement of weapons and ammunition.

At the exit, holes with parapet effaced, for trench weapons and machine guns, with emplacements carefully chosen so as to sweep the exits.

Moreover, these redoubts are mined and can be blown up from any one of the exits.

route, branches are constructed, where platforms, shelters for machine guns and trench weapons are installed. According to the position of these communications, whether on the axis or on the flanks of the supporting point, they are prepared with single or double fire crest.

Number.—Between the fire trench and the last support trench there must be at least one approach per element of platoon or section trench.

In rear of the last support trench and for every 300 meters of front, two approaches, at least, for the forward movement; a third approach for evacuations and the movements towards the rear (evacuation approach). This approach must have a trace and profile which permit the easy passage of the litters. It is on the route of this third approach that the protected first-aid stations will be branched.

The approaches in rear of the supporting point must be pushed to 4 or 5 kilometers, according to the terrain. They must permit the circulation of 2 men abreast, but they will then be deepened (2 meters at least) and carefully constructed at the angles, so as to assure sufficient protection. Recesses with exit steps will be arranged every 100 meters so as to facilitate circulation, and in case of need, a rapid exit.

The approaches will be connected, as closely as possible, to the command posts and observatories.

27. *Shelters.*—The shelters will be sufficiently numerous to shelter during bombardment the whole of the occupants of the supporting point, with the exception of the observers and the indispensable look-outs, themselves placed in each line of defense under defiladed and protected observatories.

The commanding officer must see to it that these shelters are unceasingly improved so that they can resist projectiles of 210 mm. and their living conditions become better.

28. *Assembly Point—Preparation of counter attacks.*—The preparation of counter attacks will be studied with care, under the most probable hypotheses; their success will depend upon their suddenness and violence.

Special shelter of assembly points will be established for the partial reserves of each strong point and for the reserve of the supporting point, in emplacements chosen so as to act rapidly towards the menaced points.

Communications issuing from these shelters will connect them to the general system of communications. Moreover, communications or special exits will be created for counter attacks (ramps, steps, facing the enemy). In particular, oblique passages well enfiladed by the trenches in rear will be opened in the accessory defenses.

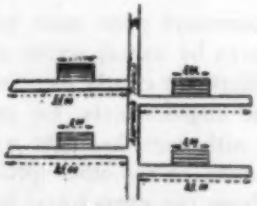


FIG. 14.—Four assembly points for section.

The arrangement to be given to the assembly points will be essentially variable. While providing for the troops the best shelter possible (in general 2 meters in depth and 1 in width), measures must be taken to provide them an easy way of debouching (Figs. 14 and 15).

In the preparation of a terrain, in

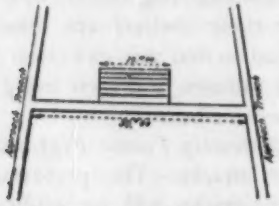


FIG. 15.—Assembly point for platoon.

view of an attack, the troops designated for the attack will wait for the instructions of the chief concerning the preparation of the assembly points.

29. *Command Posts.*—Strong and supporting points have each a command post connected electrically with the front (trenches), with the rear (higher command and the artillery), with the neighboring strong points, and with the command post of the supporting point.

Each office of command of a supporting point must be connected with the neighboring supporting point, and with the commanding officer of the section.

The command posts must be easily found, even by liaison agents of other units. Mark out clearly the itineraries, mark the emplacements, for example, by day, with flags, by night with colored lanterns, or any other special sign, *visible from the approaches,* but defiladed from the enemy's view (small niches).

30. *Telephone Connections.* — They are of two kinds:

(1) Communications for the officer of command established by the telegraph sappers.

(2) Interior communications between units of infantry and artillery or connection infantry and artillery, established by the regimental telephonists.

Fig 16 gives an example of the logical organization of a sector, held by a regiment of three battalions, having each three companies in the first line. The regiment must, as a rule, connect up with the brigade and with the groups of light artillery which operate on its front. The brigade post is in general organized by units of telegraph sappers.

31. *Trench Weapons.* — Numerous trench weapons (trench cannon, special mortars, lance bombs) will be installed in the center of resistance. The emplacements can be prepared in the trench itself. But it is preferable to dispose these weapons in special emplacements, branched on the approaches. The emplacements must be hidden with the greatest care to avoid being located by the enemy. Each emplacement must be completed by shelters for the personnel and the ammunition.

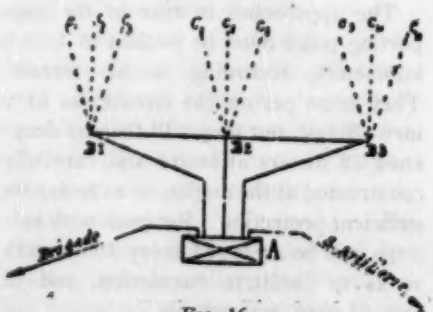


FIG. 16.

A. Command post of the colonel.
B. Command post of the battalion commander.
C. Command post of the captain.

The emplacements must be numerous, in number superior to that of the batteries available, so as to displace and use elsewhere the weapons that may be located by the enemy, and in order to concentrate on certain points strong batteries.

32. *Artillery.*—There may be allotted to the supporting point for its own use

some field pieces intended for flanking. These pieces are always sheltered under casemates. If they utilize uncovered emplacements, the pieces will be kept in waiting in bombproof shelter. These pieces generally work for the benefit of a center of resistance other than that in which they are installed; a special telephone line must establish the necessary communication.

33. *Organized Defense of Intervals.*—These are zones organized for defense, not much occupied in normal times, comprised between two strong or supporting points. They must be swept by fire and watched carefully. These intervals are generally chosen on account of the difficulties that the terrain offers for the enemy's progress by reason of natural obstacles (marshes, low-lying land, rocky ground). An interval never comprises an empty space. It comprises especially:

(*a*) A continuous obstacle consisting of accessory defenses which will be rendered as strong and as impenetrable as possible, with passages arranged for friendly patrols and attacks.

(*b*) In rear of these defenses, an observation approach trench prepared as a fire trench, constituting thus with the first line trenches strong points connected up—a continuous line of trenches. The continuous line, in addition to preventing the enemy from filtering through, removes from the defender the idea of being isolated in his strong point.

In case of attack by the enemy, the interval is garrisoned, and the density of the defense becomes equal to that of the works of the strong points or of the neighboring centers of resistance.

(*To be continued*)

A Practical Plan for Training Infantry

By Captain W. N. Hughes, Jr., Infantry

AS LARGE accessions of officers and soldiers who have but limited experience in the military service will be made to the Army under the acts of Congress, it is essential that certain well-recognized principles should be borne constantly in mind.

To be effective in time of war, military training must be uniform throughout the service and must conform to certain basic principles possessing varying degrees of importance. A due sense of proportion of these principles and a full appreciation of the relative merits of those qualities constituting the standard to which the Army must attain are expected of all commanding officers.

Patriotism is of the first importance. An absolute and unqualified devotion to the welfare and success of our country is an indispensable prerequisite that has always constituted the soul of our Army.

Discipline distinguishes thoroughly trained and instructed troops from an irresponsible, unwieldy and disorderly aggregation of men. Its essential characteristics are respect for and implicit obedience to superior authority. Its vital importance must be thoroughly impressed upon all in the military service. Cheerful, earnest and loyal obedience should be promptly paid by all subordinates to lawful orders of superiors.

Physical development of the soldier should be such that it will render the soldier capable of the greatest endurance on the march and on the field of battle. The most endurance is attained by passing through a progressive course of training that improves the voluntary muscles and vital organs. To this end, marches of increasing length, with increasing weight of packs and daily setting-up exercises, are superior for infantry to all other methods of physical development.

Self-respect, self-reliance and *resourcefulness* are qualities in a large measure inherent in our soldiers and should be cultivated to the fullest extent in their training.

Professional knowledge leads to the greatest efficiency when intelligently applied in actual practice.

To render the most *perfect service on the field of battle* is the final object for which our army is created and maintained.

Fundamental Principles and General Directions Governing the Training of Infantry

a. Instruction, inspection, responsibility and authority or command are inseparable.

b. The officer must know the duties of the men under his command in addition to his own specific duties.

c. Officers and noncommissioned officers of each grade should be competent to take up the duties of the next higher grade. Military efficiency can only be attained through competent and instructed officers and noncommissioned officers.

d. The efficiency of the squad, including its leadership, is the basis of efficiency, and this efficiency in turn de-

pends on the thoroughness of the training of individual members of this unit.

e. The efficiency of every command depends on the efficiency of the units or teams composing it. As each team in a large command must be under the direct control of its immediate chief, it is evident that such chief should have all possible charge of the instruction of his team. Authority and responsibility should exist in equal degree. From such a system there should result not only suitable instruction of the team, but also comradeship among the individual members, pride in the team as a unit, and that confidence and habit of command on the part of the leader so necessary to efficient leadership.

f. The best instruction is that which is *practical and which is taught through personal contact* between instructor and those under instruction. Any other kind is justified only when practical instruction cannot be given.

g. The paramount object of instruction is not to impart knowledge as knowledge, but rather to so train the soldier that he shall be better qualified each day in meeting the situations that may face him in the field. It is believed that this desired development can be secured by accustoming the soldier to investigate for himself.

h. The applicatory method of instruction should be used as far as possible. This method finds its principal application in theoretical instruction, but its advantages should not be overlooked in practical work. (*Example:* A company commander signaling to platoon commanders without company actually being present.)

i. The ultimate object of all instruction being *field service efficiency,* field maneuvers and field firing should be considered as the culmination of previous training and the test of its thoroughness.

j. There must be a definite and progressive plan and schedule of instruction. Every course of instruction should embrace certain definitely prescribed subjects and be for a definite period in order to unify instruction, prevent unnecessary repetition, and use the available time to the best advantage. On the completion of the prescribed course of theoretical instruction, all study should not cease, but sufficient postgraduate work should follow to broaden the student's professional horizon and keep him in touch with new methods and ideas.

k. Drill movements are of two general classes: (1) drills of precision; (2) maneuver and combat exercises.

The precise movements of the manual of arms and close-order drill are not for the purpose of teaching men how to get about on the battlefield. They will hardly be used there at all. One of the principal objects is to train the soldiers' minds and bodies to *habits* of precise, unhesitating obedience to the will of the leader, so that in the stress of battle they will obey without conscious effort, mechanically, automatically, as the easiest and most natural line of action.

Maneuver and combat exercises are intended for instruction in the proper handling of troops in campaign and on the battlefield. Only such mechanical precision of movement is required as is necessary to keep the troops from getting out of hand. There should be rigid adherence to orders and instructions.

It is hardly possible to properly conduct a drill or exercise without special forethought and preparation for that particular drill or exercise. After each

drill or exercise the specific work for the next one should be announced, so that leaders may have time to prepare themselves.

The drill or exercise should be made interesting, not only by variety, which is necessary in order not to exhaust the soldier's attention by straining it too long on one subject, but also by comments on the part of leaders, continued throughout the drill and directed toward those elements whose performance is unusually good or bad.

l. Time is important, but *proficiency* is the most important factor in infantry training.

Duties of Regimental, Battalion and Company Commanders

Regimental commanders will prepare a schedule of instruction based on the plan of instruction covering, as far as practicable, the subjects in the order named hereafter, and issue an order setting forth the schedule which will include:

1. The period of training.
2. The subjects to be covered and the period assigned to each.
3. The responsibility to which commanders of units will be held.

The duty of seeing that the prescribed instruction is carried on lies with the regimental commander and his field officers, and with this end in view they should personally observe the instruction which is being given to the companies. If they cannot observe the instruction, they should keep in touch with the same by means of reports. They should, however, carefully refrain from interfering with any system which is producing results, remembering that no two men will proceed along exactly the same lines. By interference superiors not only destroy initiative, but also weaken the authority of the subordinate commander over his men. Interference is justified only when such a commander fails to follow the course of instruction prescribed or shows such a lack of judgment in his methods as to render it certain that the results desired will not be accomplished. This does not mean that a suggestion from a superior officer should not be made or followed, but such suggestion should be carefully considered and only made when it is certain better results will follow its adoption.

Having received a schedule of instruction, the company commander should lay his plans covering all details of the subject not prescribed by higher authority. Recruits and other ill-instructed men should be grouped together and assigned for instruction to a specially qualified officer or noncommissioned officer. With this exception, each unit leader should, if possible, be the instructor of his own unit. Each drill should be governed by a schedule showing the subjects assigned to each group and the corresponding allowance of time.

The captain should supervise the instruction of the various groups, making corrections and suggestions only when he sees that satisfactory results are not forthcoming, and then not in the hearing of the men.

Aids in Instruction

Assuming that four hours will be devoted to instruction at each assembly in the morning and afternoon, it is believed that about an hour, including short rests, is all that can profitably be used for ***drill.*** The remaining time should be given to some other kind of instruction.

It is desirable that provision be made for a gallery practice range, a sand table, a map for map problems, and some device to serve as a target in instruction in fire direction. A rough route sketch on paper or on a blackboard on a scale of about 12 inches to the mile will serve for map problems, but a relief map is the best device for practical instruction. A board arranged so that it can be raised or lowered and having painted on it a line of prone silhouettes makes a good target. Every headquarters, machine-gun and supply company should have one or more wooden horses so constructed as to permit of saddling, bridling, and harnessing. If animals have been issued, the wooden horses will not be necessary.

Basis of Infantry Training

The training of Infantry is based on the subjects covered in Infantry Drill Regulations (I. D. R.), Field Service Regulations (F. S. R.), Manual for Noncommissioned Officers and Privates (M. N. C. O.), Small Arms Firing Manual (S. A. F. M.), and Manual Physical Training (M. P. T.).

Training Plan

ALL COMPANIES

1. *Recruit instruction:*
   - *a.* Articles of war, Section 5, Chapter XIV, M. N. C. O.
   - *b.* Military discipline and courtesy, Chapter I, M. N. C. O.
   - *c.* Arms, uniforms and equipment, Chapter II, M. N. C. O.
   - *d.* Personal hygiene and care of feet, Chapter IV, M. N. C. O.
   - *e.* School of the soldier, Section 4, Chapter V, M. N. C. O.
   - *f.* School of the squad, Section 5, Chapter V, M. N. C. O.
   - *g.* Setting-up exercises, Recruit instruction, pages 31 to 50, M. P. T.
   - *h.* Orders for sentinels, Section 10, Chapter IX, M. N. C. O.

RIFLE COMPANY

2. *Squad instruction:*
   - *a.* Test of recruits by squad leader in subjects 1 *b* to *h* inclusive.
   - *b.* Setting-up exercise, "Trained soldiers" instruction, pages 50 to 93, M. P. T.
   - *c.* School of the squad, Section 5, Chapter V, M. N. C. O.
   - *d.* Tent pitching, Section 8, Chapter V, M. N. C. O.
   - *e.* Bayonet exercise and bayonet combat, Section 9, Chapter V, M. N. C. O.
   - *f.* Whistle and arm signals, Section 3, Chapter V, M. N. C. O.
   - *g.* Color sentinels, countersigns and paroles, compliment from guards, guarding prisoners and flags, Chapter IX, M. N. C. O.
   - *h.* Sighting drills, S. A. F. M.
   - *i.* Position and aiming drills, S. A. F. M.
   - *j.* Making triangles, S. A. F. M.
   - *k.* Gallery practice, S. A. F. M.
   - *l.* Target practice, Chapter VIII, M. N. C. O.
   - *m.* Musketry duties of the squad and squad leader, involving target designation, distribution of fire on target, fire discipline, fire direction and fire control, I. D. R.
   - *n.* First aid to the wounded, Chapter XIII, M. N. C. O.
3. *Platoon instruction:*
   - *a.* Test of squads by platoon leader on subjects 2 *c*, *d*, *e*, *f*, *m* and *n*. (Paragraph above).

b. Drill, close order, Sections 4, 5 and 6, Chapter V, M. N. C. O.

c. Drill, extended order, Sections 5 and 6, Chapter V, M. N. C. O.

d. Musketry duties of platoon and platoon leader, involving:

Target designation, pars. 244, 245, 247 and 415, I. D. R.

Finding the range, pars. 239, 240, 411 and 412, I. D. R.

Distribution of fire, pars. 245, 246 and 413, I. D. R.

Fire discipline, pars. 254, 416 and 417, I. D. R.

Fire direction, pars. 239, 244 and 251, I. D. R.

Fire control, 233, 252, 255, 256, 257 and 417, I. D. R.

Communications, pars. 42, 43, 47, 158, 234, 252 and 417, I. D. R.

e. Rifle trenches, Section 8, Chapter VI, M. N. C. O.

f. Individual cooking, Section 2, Chapter III, M. N. C. O.

4. *Company instruction:*

a. Test of squads in subjects, 2 *c*, *d*, *e*, *f*, *m* and *n*. (Paragraph above.)

b. Test of platoons in subjects, 3 *b*, *c*, *d*, *e*, and *f*. (Paragraph above.)

c. School of the company, close order, M. N. C. O. and I. D. R.

d. School of the company, extended order (by signals only), M. N. C. O. and I. D. R.

e. Company inspection, M. N. C. O. and I. D. R.

f. Commander, sergeant, and corporal of the guard, Sections 4, 5 and 6, Chapter IX, M. N. C. O.

g. Guard mounting, Sections 19, 20 and 21, Chapter IX, M. N. C. O.

h. Setting-up exercises (30 minutes each day) and swimming, M. P. T.

i. Musketry duties of the company involving:

Target designation, I. D. R.

Finding the range, I. D. R., and S. A. F. M.

Distribution of fire, I. D. R.

Fire discipline, I. D. R. and S. A. F. M.

Fire direction, I. D. R.

Fire control, I. D. R.

Communication, I. D. R.

j. Field service, Chapter VI, M. N. C. O.

k. Marching and camping, Chapter VII, M. N. C. O.

l. Range practice, known distance, small arms firing courses, S. A. F. M.

m. Training range estimators, I. D. R. and S. A. F. M.

n. Field firing, S. A. F. M.

o. Combat exercise, I. D. R. and F. S. R.

p. Night drills and attacks, I. D. R.

q. Entrenching, and practical use of sandbags and other revetting material.

r. Noncommissioned officers' school: M. N. C. O., entire book; practical map reading and sketching; practical exercises in field service, Chapter VI, M. N. C. O., involving writing messages and orientation.

s. In addition to the foregoing requirements, instruction will be given as follows:

1. First sergeant and company clerk in the preparation of correspondence, returns, small arms and other reports, muster and pay rolls; and in the use of morning reports,

sick reports, duty rosters, ration returns, and individual records of enlisted men.

2. Mess sergeant and cooks in the study of the Army Cooks' Manual, Army Bakers' Manual, the components of the ration, the nomenclature, care and preservation of field ranges, march kit and cooking utensils; sanitation of kitchen and mess hall, including the disposal of garbage.
3. Supply sergeant in the study of Infantry Unit Accountability Equipment Manual, General Orders, No. 39, War Department, 1915; the issue, care, and preservation of leather, equipment, clothing and arms; the handling and accounting (practical and theoretical) of all company property.
4. Mechanics in practical work in the repair, care and preservation of arms and equipment of company. For reference: Ordnance Pamphlets, No. 1866, Description of Automatic Pistol, caliber .45; No. 1965, Instruction for the Care and Repair of Small Arms and Ordnance Equipment; No. 1923, Description and Rules for Management of United States Magazine Rifle, caliber .30; No. 1925, Description and Instruction for Management of Gallery Practice Rifle, caliber .22; and No. 1717, Instructions for Assembling the Infantry Equipment, model 1910.
5. Buglers in signaling (wig-wag and semaphore), carrying verbal messages, practice i service call, and drill with company.

Method of Instruction and Testing for Proficiency

The following is the *method* prescribed for the instruction of the company:

a. Each recruit should qualify in each subject in recruit instruction before being admitted to squad instruction. The minimum time for this instruction is not given before the recruit is tested by the squad leader. Proficiency, and not time, is the factor. The recruit will not be passed to the squad unless found proficient.

b. Under the supervision of officer or platoon commander, *the squad* should be instructed by its squad leader in the following subjects, all the squads at work at the same time:

1. Drill, facings, marchings, opening and closing ranks, taking intervals and distance, stacking arms and manual of arms.
2. Deploying and assembling as skirmishers.
3. Loadings and firings.
4. Turning on fixed and moving pivots.
5. Arm signals.
6. Tent pitching.
7. Rolling blanket rolls or making packs.
8. Care and cleaning of rifle, including dismounting and assembling bolt and magazine.
9. Sighting drills.
10. Position and aiming drills.
11. Making triangles.
12. Gallery practice.
13. Setting sights, including the

verification by leader of correct setting of each sight.

14. Personal hygiene, care of feet and first aid to wounded.
15. Bayonet exercise and bayonet combat.
16. Duties of privates on guard duty.
17. Designating target. Distribution of fire to cover entire target.
18. Directing fire from one angle to another.
19. Controlling fire by commands and signal "faster" and "slower."
20. Other subjects under squad instruction.

The company or platoon commander will test the squads for proficiency in the subjects in the order named at regular intervals and upon being found proficient the squad should be advanced to another subject.

c. The *platoons* will be instructed by the platoon commander in all the subjects given in platoon instruction, all the platoons at work at the same time. The company commander will test the platoons for proficiency in the subjects in the order named and, upon being found proficient, the platoon should be advanced to another subject.

d. The company will be instructed by the company commander in all the subjects required in company instruction. The company will be tested in the requirements for company instruction by the battalion commander.

THE COMPANY TEST

The company test will be as follows:

a. Drill, close order movements (1 to 5 compulsory; 6 to 10 required if time permits).

1. Turn company on fixed and moving pivots.
2. From line, march to rear more than a few paces, form column of squads, change direction and form line simultaneously by squads.
3. Execute on right (left) and front into line.
4. From line, form line of platoons, column of platoons and on right (left) into line.
5. From line, form column of squads, line of platoons, column of squads, column of platoons and front into line.
6. Open and close ranks.
7. Take interval and distance.
8. From line, form column of platoons, change direction and form line again.
9. Diminish the front of a column of squads and form column of squads.
10. Have company fall out. Form and align company. Execute eyes right, facings, steps and marchings, dismiss company.

b. Drill, extended order by signals only (1 and 2 compulsory; 3 required if time permits).

1. From line, form skirmish line to front, execute squad columns, deploy, assemble company direct.
2. From column of squads, form skirmish line, execute platoon columns, deploy, assemble by platoons, assemble company.
3. Execute rush by squads and platoons.

c. Manual of arms, stack and take arms; minimum requirements: Exe-

cution of right shoulder, left shoulder, order, port, present, trail, stack, take and inspection arms, parade rest, and rifle salute.

d. Loadings and firings, minimum requirements: Execute load, fire three volleys, fire at will, suspend firing, clip fire, cease firing, unload.

e. Musketry duties, 1 compulsory:

1. Firing data are given to company commander who announces range, designates target and division thereon for distribution. Data transmitted by subordinate leaders. When each squad and platoon is ready to fire this will be announced by signal "Ready." Fire opened by signal. Faster and slower signals given. New firing data announced to company commander giving new target and new range. Action by him and execution by company.
2. Field firing problem if practicable.

f. Minor tactics: One tactical exercise involving advance or rear guard, outpost and combat compulsory; others required if time permits.

1. A simple problem on sand table map, or blackboard involving company in advance guard and an outpost. Orders issued and action taken by company and platoon commander and squad leaders in solution of problem.
2. A simple patrol problem. Conduct of patrol in solution of problem. (Orders issued and action taken by members of patrol as phases are developed.)

g. Target practice. Examination of records to ascertain progress made in preliminary training, gallery practice and range firing.

h. Construction of firing trenches.

i. Individual cooking.

j. Swimming if practicable.

k. Bayonet exercise: 1 to 4 compulsory, 5 and 6 required if time permits.

1. Execution of foot movements.
2. Attacks.
3. Defenses.
4. Combined movements.
5. Individual bayonet fencing.
6. Combat (squad versus squad). It is suggested that padded sticks similar to rifles be substituted for rifles in this combat work.

l. Company inspection equipped for field service, involving pitching shelter camps.

m. Buglers tested in service calls, receiving and delivering verbal messages and signaling (wig-wag and semaphore).

n. Squad leaders as instructors, minimum requirement. Squad leaders with squads a few paces apart will be required to instruct squads in manual of arms, facings, steps, loadings, and firings, setting of sights, firing faster and slower and turning on moving and fixed pivots.

o. Noncommissioned officers in:

1. Map making.
2. Map reading.
3. Estimating distances.
4. Writing messages.
5. Orientation.

Records of Proficiency

It is important that a record of proficiency be kept in order that definite knowledge may be had of the progress

made not only by the company commander but also for higher commanders and in order that, if at any time there should be a change of company commander, the new company commander may be able to continue the work without additional tests to verify the progress of instruction in the company. Accordingly records should be made as follows:

a. Individual.—A card for each man should be kept showing the subjects in which individual proficiency is required, and upon being found proficient in any subject this remark should be shown on the man's card opposite the subject.

b. Squad—A card for each squad should be kept showing the subjects in which squad proficiency is required and upon being found proficient in any subject this remark should be shown on the card for the squad opposite the subject.

c. Platoon.—A card for each platoon should be kept showing the subjects in which platoon proficiency is required and upon being found proficient in any subject this remark should be shown on the card for the platoon opposite the subject.

d. Company.—A similar card for each company should be kept by the battalion commander.

HEADQUARTERS COMPANY

A headquarters company will be instructed in the following subjects:

a. Members of the band in litter drill, music, school of the soldier, marching, first aid to the wounded (theoretical and practical), and the nomenclature, care and preservation of band instruments.

b. Mounted orderlies (theoretical and practical) in riding, bridling, saddling and care of horses; signaling (wig-wag and semaphore), carrying verbal messages.

c. Sergeants major and color sergeants in their duties at ceremonies and drills as prescribed in the Infantry Drill Regulations; in the preparation of returns and reports, correspondence and the use of morning reports, sick reports, duty rosters, ration returns, individual records of enlisted men, small-arms reports; in studies of Army Regulations, Field Service Regulations, and other books and papers pertaining strictly to their duties as clerks at regimental or separate battalion headquarters. They will also be instructed in semaphore signaling.

d. First sergeants in the preparation of correspondence, returns, muster and pay rolls, and in the use of morning reports, sick reports, duty rosters, ration returns, individual records of enlisted men, small-arms reports, and in their duties at ceremonies and drills as prescribed in the Infantry Drill Regulations. They will also be instructed in semaphore signaling.

e. Mess sergeants and cooks in the study of Army Cooks' Manual, Army Bakers' Manual, the components of the ration; the nomenclature, care, and preservation of field ranges, march kit and cooking utensils; sanitation of kitchen and mess hall, including the disposal of garbage.

f. Supply sergeants in the study of Infantry Unit Accountability Equipment Manual, General Orders, No. 39, War Department, 1915, the issue, care and preservation of leather, equipment, clothing and arms; the handling and accounting (practical and theoretical) of all company property.

g. Stable sergeants in the study of Manual for Farriers, Horseshoers, Saddlers and Wagoners or Teamsters; the

care and treatment of animals, and the care and preservation of harness, saddles and bridles.

h. Sergeant bugler as prescribed for buglers in a rifle company.

i. The horseshoer in the study of the manual named in paragraph *g* above.

j. All members in making the pack, camp sanitation, personal hygiene, and the use of the first-aid packet; the nomenclature, care and preservation of the rifle or pistol, depending upon the weapon with which they are armed.

k. All members armed with rifle in sighting, position and aiming drills, and in gallery practice.

l. All noncommissioned officers will be instructed in semaphore signaling.

SUPPLY COMPANY

A supply company will be instructed in the following subjects:

a. Regimental supply sergeants in the preparation of property returns, correspondence, ration returns; in studies of Army Regulations, Field Service Regulations, General Orders, No. 39, 1915, War Department, Infantry Unit Accountability Equipment Manual, price list of clothing and equipment (annual general order of War Department), Quartermaster Manual, and other books and papers, also blank forms pertaining strictly to their duties as supply sergeants.

b. First sergeants, mess sergeants, stable sergeants, cooks, saddlers, as prescribed respectively for the same positions for a headquarters company.

c. Corporals as prescribed for stable sergeants.

d. Saddlers as prescribed for horseshoers in a headquarters company.

e. Wagoners in the study of Manual for Farriers, Horseshoers, Saddlers, and Wagoners or Teamsters; the care and treatment of animals and the nomenclature, care and preservation of harness and wagons.

f. All noncommissioned officers will be instructed in semaphore signaling.

g. All members in making the pack, camp sanitation, personal hygiene and the use of the first-aid packet; the nomenclature, care, and preservation of the rifle or pistol, depending upon the weapon with which they are armed.

h. All members armed with the rifle in sighting, position and aiming drills, and in gallery practice.

MACHINE-GUN COMPANY

A machine-gun company will be instructed in the following subjects:

a. Individual training with automatic machine rifle:

1. Taking down and setting up.
2. Functions of actuator, feed piece, gas chamber, sear, trigger, feed-piece spring, extractor, fermature nut, ejector, breechblock, cartridge stop.
3. Gas regulation, and its effect on rifle.
4. Reduction of jams; explain and show methods.
5. Replacing barrel, feed piece, feed-piece spring, actuator, extractor, ejector, sear, breechblock, trigger.
6. Drill with rifle, set up for firing, execute cease firing, suspend firing, load, pack.
7. Lay rifle, execute search, distribute, and fixed fire.
8. Use rifle without mount, use latigo strap, sandbags.
9. Use of elevating mechanism and barrel rest.
10. Use sights, and range deflection.
11. Explain and give firing data.

12. Prepare rifle for action, action front, right, left.
13. When to use fixed, search, and distribute fire.
14. Use of cover and concealment.
15. Pointing out and finding targets. Team work between gunner and rest of squad.
16. Select gun positions.
17. Firing rifle on miniature and long-range targets.
18. Aiming exercise, ranging exercise, traversing exercise, bull's-eye, field and miniature silhouette targets.
19. Resizing feed strips, and reloading.
20. Exercise in disturbing rifle to teach quick laying on target.

b. School of packer. (Ordnance Handbook No. 2130, and Pack Transportation, Quartermaster Corps.)

1. Names and use of pack equipment. (Ordnance Handbook No. 2130.)
2. Disposition of pack equipment. (Par. 74, D. R.)
3. Folding blanket. (Par. 82, D. R.)
4. Harness by detail. (Par. 84, D. R.)
5. Unharness by detail. (Par. 86, D. R.)
6. Packing and unpacking. (Pars. 88, 89, D. R.)
7. Loading mule, care of pack mule, grooming, watering, and feeding. (Par. 148, D. R.)
8. Names of parts, setting up, and fitting aparejo, repacking and adjusting. (Ordnance Handbook No. 2130.)
9. Fitting crupper. (Ordnance Handbook No. 2130.)
10. Care of pack animals; scratches, bumps, bunches, belly-bunches, swellings, rope burns, loss of appetite, shoeing, thrush, injuries of all kinds.
11. Adjusting aparejo and crupper to cure bunches and abrasions.
12. Balancing loads.
13. How to get animal up when mired, tangled in rope, use of twitch, etc.
14. Cleaning and care of leather, metal parts, use of castile soap, harness and neatsfoot oil.
15. Packing machine-gun equipment with field equipment.
16. Nomenclature and method of coaling ropes for packing loads: (*a*) lair ropes, (*b*) sling ropes, (*c*) lash ropes.
17. Packing with top load.
18. Adjusting load on march.
19. Conduct and care of pack animals on march and in camp.

c. School of the soldier.

1. Physical drill and exercises. (M. P. T.)
2. School of soldier. (I. D. R.)
3. Drill with pistol.
4. Sighting, aiming, loading, cleaning pistol.
5. Nomenclature of pistol.
6. Care of equipment.
7. Arrangement of equipment for inspections.

d. Squad training.

1. Composition, formation, squad. (Par. 147, D. R.)
2. Teamwork within the squad and as such.
3. Duties of squad leader. (Par. 56, D. R.)
4. Duties of gunner. (Par. 57, D. R.)
5. Execution of firing data. (Pars. 56, 61, 62, 63, and 64, D. R.)
6. Loading mule. (Par. 147, D. R.)
7. Harness and pack by squad. (Par. 149, D. R.)

8. Form squad. (Par. 150, D. R.)
9. Squad drill; squads right, left, to the rear.
10. Link and unlink mules. (Par. 150, D. R.)
11. Preparation for action, extended order drill. (Pars. 160, 161, D. R.)
12. Unpack and unharness.
13. Pack. (Pars. 162, 163, 164, and 165, D. R.)
14. Tactical use of guns in attack, defense, kinds of fire on various targets.
15. Use of guns in ranging fire.
16. Selection and occupation of gun positions.
17. Reloading and supplying ammunition to guns. (Par. 312, D. R.)
18. Communication between guns and mules.
19. Signals.
20. Construction of cover.
21. Firing rifle in squad problems on target range.
22. Location of targets, use of rifle for aiming points off target.

e. Practical drill.—Parts of Infantry Drill Regulations and Manual for Noncommissioned Officers and Privates of Infantry, relating to individual instruction of enlisted men.

f. Practical drill (a) without animals; (b) with animals and packs.—Combined Infantry and Cavalry Drill Regulations for automatic machine rifle, caliber .30.

g. First sergeants, mess sergeants, supply sergeants, stable sergeants, horseshoers, saddlers, and cooks, as prescribed respectively for the same positions for a headquarters or supply company.

h. Buglers in signaling (wig-wag and semaphore), carrying verbal messages, practice in service calls, duties as agents of communication (Field Artillery Drill Regulations), and drill with company.

i. Mechanics in the nomenclature, care, repair, and preservation of machine guns and pistols, the care and preservation of company and individual equipment; in the study of ordnance pamphlets on machine guns and accessories.

j. All noncommissioned officers in the care and use of the range finder.

k. All members in wig-wag and semaphore signaling, making the pack (individual equipment), camp sanitation, personal hygiene and the use of first-aid packet; the nomenclature, care, cleaning and preservation of machine gun and pistol, in sighting, position and aiming drill and in gallery practice.

l. When the entire organization is proficient in the foregoing requirements, instruction in packing, single diamond, will be taken up.

m. The company should be equipped with improvised dummy mules made of barrels with legs or of a similar construction, in order to teach the mechanism of packing. If pack mules have been issued to the company the dummy mules will not be necessary.

n. The instruction prescribed above is for automatic machine rifle, caliber .30 (Benét-Mercier). If the company or troop is equipped with Maxim or Lewis gun, the instruction will follow that given as closely as possible.

o. If the transportation of the guns and equipment is to be by autotruck, the School of Packer will be omitted and there will be substituted instruction in the care, repair, preservation and operation of the autotruck and in packing and unpacking from the autotruck.

AUTHORITIES GOVERNING THE INSTRUCTION AND INSPECTION OF INFANTRY

Company commander responsible for instruction, Paragraph 266, Army Regulations.

Parades, Paragraph 436, Army Regulations.

Muster, Inspection and Reviews, Paragraphs 438, 439, and 1432, Army Regulations.

Reserve Ration and Individual Cooking, Paragraph 1205, Army Regulations.

First Aid to Sick and Wounded, Paragraph 1419, Army Regulations.

Signaling, Paragraph 1562, Army Regulations.

Reading Articles of War, Paragraph 110, Articles of War.

Uniforms of Officers, Paragraph 36, Uniform Regulations.

Saber and Bayonet Exercises, Section II, General Orders 72, War Department, 1907.

Athletic Competitions, Circular 35, War Department, 1908.

Garrison Schools, General Orders 70, War Department, 1910, as amended.

Inspection Venereal Disease, General Orders 17, War Department, 1912.

Training Mobile Army, General Orders 17, War Department, 1913.

Training National Guard, General Orders 36, War Department, 1916.

Private Mounts, Paragraph 1080, Army Regulations; General Orders 34, War Department, 1914, and General Orders 9 and 15, War Department, 1916.

New Manuals of Drill Regulations, General Orders 150, War Department, 1911.

Athletics, Letter War Department, November 5, 1907.

Night Operations, Letter War Department, February 11, 1908.

Principles for Military Training, General Orders 107, Adjutant General's Office, 1901.

A Letter to a Training Camp Student[1]

YOU are about to take up the study of the military art, to qualify yourself to be an officer. There are some things I would like to tell you for your aid. I have seen some service and met with some measure of success; but, more than this, I have observed many officers who met with success, partial success, or failure. I think I know why some have succeeded and others failed. You have what many I have seen have not had, a thorough general education. This is very much to the good and should be a great help. You have learned to think closely and logically, to comprehend things, and draw logical conclusions from facts. You can acquire knowledge from books unaided by an instructor. This is all to the good, if book work has not made you bookish and taken away the practical sense of things and the will power to decide and act quickly.

Apart from sentiments of patriotism (which with a soldier should be quite a matter of course and unnecessary to talk about), and apart from the power the military profession gives to render service to the country, I hope you will realize that the profession of arms is a worthy one and worth while in a large sense. There is no other that calls for so complete and harmonious a development of all a man's powers of body, mind and soul.

I have known failures from bodily infirmity. By this I do not mean altogether defects that would cause a man's rejection as physically unfit, but some weakness or abnormality that clouded the intellect and made infirm the will. Alcoholism is an example (but only an example) of this very thing. No man can be 100 per cent efficient who is an alcohol addict, because the bodily weaknesses it engenders affect not only bodily efficiency but the mind and will as well. So of any other bodily deviation from sound health and harmonious physical development. Keep yourself physically fit, as fit as possible, with all possible reserves of physical strength and energy. You may need the last ounce.

The profession calls for the highest intellectual qualities. I do not mean now by this mere knowledge—although in this day there is hardly an art or science which does not have its place and play its part in the game of war—but harmonious as well as strong intellectual powers. Quick, logical and accurate thinking, the power to reject irrelevancies and to go intellectually straight to the mark—this is what I mean. It is not alone the powers of logic and reasoning, but the powers of a reasoned and controlled imagination, the power to visualize completely and truly things only half seen or half known, the power that penetrates the "fog of war," that power that enables the subordinate to grasp the whole plan of his superior and carry it out without needing long and laborious explanations, the faculty that sees the plan of the enemy in time to thwart it. All this involves intellectual power of the first order.

[1]This is an extract from a letter written to a training camp student by Col. C. H. Hitchcock, R. L., N. Y. N. G., and contains such excellent advice that it is published for the benefit of all new officers.

War also demands the highest development of those loftier faculties we call the soul of men. Prominent among these is courage. By this I do not mean the ordinary quality of physical courage. This ought to go without any saying, the same as a man's patriotism. The courage of the soldier, particularly of the officer, must go further than this. He must have the courage and resolution to think calmly and decide quickly in times of difficulty and danger. He must have the courage to give orders that may involve the sacrifice of the lives of others when the occasion demands. He must have the calm soul, not yielding in difficulty or defeat, and fortitude to endure hardships, toils and discomforts beyond measure, not merely with stoic indifference, but with cheerfulness. He must have loyalty to his superiors to carry out orders faithfully, not always to the letter, but according to their intent; to do in each case of doubt what he thinks his superior would have him do, sometimes against his own judgment. Loyalty to his subordinates, to do always his best by them and for them, and to treat them always fairly and honestly. He must have honor, not according to the artificial ideas of chivalry or romance, but in the common, homely and practical way. His report or statement in any matter of moment must impart the most absolute verity, and his promise must be absolutely dependable. Without this honor, which is the same as honesty, discipline would fail and armies could not remain in cohesion. Officers must have confidence in each other, and the only basis for this is truth.

The possession of these qualities in some considerable degree is essential to a true soldier, and the profession which cultivates and practices them must perforce be a worthy and honorable one.

Assuming, as I believe we may, that you have these qualities in a fair degree and have the mind and disposition to cultivate and increase them, you have a safe foundation to build success upon. The next question is how, as a practical matter, will you fit yourself for the duties of your profession.

You will of course first study the manual of your arm of the service. Along with this study of your own arm of the service you should study the other arms of the service. You will have to work with them and, while you will not know them as you do your own, you will need to know their functions, capabilities and limitations in order to work with them and for them to the best advantage. An army is a great and complicated machine. It is ineffective unless its parts coordinate with each other and work in harmony. The foundation of this must be an intelligent understanding in each arm of the other arms.

The present war has enormously developed the use of artillery and machine guns. It is still true, however, that the infantry is the army, and that the other arms, however necessary, are auxiliary to it. The cavalry may overrun hostile territory, the artillery may batter the enemy's position to rubbish, but until the infantry has gone forward and defeated the hostile infantry and occupied the position nothing of real moment has been done. It is the function of the artillery to prepare the way for the advance of their infantry by directing its fire upon that element of the enemy's force which prevents or impedes its advance, first perhaps upon

the hostile artillery, then upon their infantry and its defenses, particularly its machine-gun emplacements. If the infantry attack succeeds, the artillery must forestall or defeat the counter-attack and sustain the infantry while it organizes and consolidates the ground that has been gained. Every arm of the service in accordance with its special uses and functions must aid the infantry, which, with all the aid that can be given it, must bear a heavy burden of toil and sustain the most serious losses.

Besides your purely technical studies you will learn and know many of the uses and customs of the service, not all of which are to be learned from books. These are practices which have grown up among military men for generations and are sanctioned and approved because of their necessity in the maintenance of harmony and discipline. I will only mention one of these things which is perhaps the most important.

The conduct or the orders of your superiors must not be criticised, questioned or even commented upon. This excludes even comment of a favorable nature. This rule is very contrary to our civilian customs and practices, but necessary for discipline. An order is an order and is to be obeyed, without cavil or evasion. The only discussion admissible is as to how it may be best obeyed. The authority of your superiors is your authority, and you must respect and obey if you would be respected and obeyed.

This suggests the last and the most important thing which I will bring to your attention. As an officer you will have to do with enlisted men and will have to secure their respect and obedience. Do not think that you have only to command in order to secure obedience. A certain kind of obedience can be secured by the infliction or threat of punishment, but there is a world of difference between the grudging, discontented obedience thus secured and the cheerful and ready obedience of willing men. You must get the forty or fifty men under you so that they will obey your slightest signal instantly —will stand by you to the last gasp, or follow you to the gates of Hades. You cannot compel this by force. How is it to be done?

By law and regulations you are the superior of the men under you. You must make this a fact and not a mere theory. This is the first thing. You must not allow any of the men under you to know more of your profession than you do, and you must not allow them to surpass you in any of the true soldierly qualities. This is necessary in order that your men may respect you. Having their respect you must do nothing to forfeit it. Your manner and bearing will have much to do with this. You must do nothing to lower yourself in their eyes. One of the rules is expressed in the regulation that familiarity between yourself and enlisted men is inadmissible. This seems like a harsh rule in democratic America, but it is one which you will find necessary to apply, but with sound judgment and discretion. The reason is that hardly one man in a hundred can meet and mingle with the men under his command on familiar terms of equality, and preserve and maintain the control necessary for discipline. Discussion and argument are likely to occur in unrestricted intercourse, and between you and them there can be no argument over matters of duty. You can hardly

be familiar with any of the men in your company or platoon without seeming to favor and distinguish them above others. This you must not do on any account. You must have no favorites.

You must, as nearly as may be, be absolutely just in your treatment of them. Men do not mind strictness in an officer who is just. This means that the men, singly and in the aggregate, must be treated fairly, the diligent and proficient rewarded and the careless and disobedient punished. You can never secure respect, discipline and obedience by any manifest effort to secure their favor. Men cannot be bought or bribed into discipline in this way. Justice and not favor must be the basis of every act of yours to the men under you.

While your dignity must be sustained and undue familiarity avoided, your manner toward your enlisted men should be marked by simplicity and kindness. The display of harshness or anger, particularly when enforcing discipline, must be avoided. So treat your men as to cause each one to think that you are personally interested in him and in his success as a soldier. Study and observe every man, and when he does well give him a quiet word of commendation. Your men should get to know and understand that it is your constant effort to see that they get what is due them in the way of rations and such comforts and conveniences as they can have in camp and field. You do not need to be demonstrative about this. The quiet way is better. They will soon find out the cause if they are supplied while others lack, and are getting good food while others are going hungry. In theory all the men in any army fare alike, but practically the men under a diligent and energetic officer fare far better than the others, and the men will know the reason why.

While your kindness and consideration towards your men, manifested in deeds rather than words, must be constant and vigilant, do not fall into the mistake of coddling them. They are men and to be treated as such, and must be made to do the hard work and incur the privations and dangers of a soldier's life like men without complaint.

Never yourself do the work of your subordinates. Make them do it. That is what you are for. This is not always the easiest way, but it makes for instruction, efficiency and discipline.

If you treat your men upon these lines and are at the same time yourself an example of soldierly conduct, they will come in the end to be influenced by and to adopt your own ideals with respect to the service. You will never accomplish this by lecturing or exhorting them. Your character, your influence and instruction will not fail to bring about this consummation. Your company or platoon will then be capable of anything that can be required of soldiers.

Varied Ground

Platoon Commander in the Trenches

Some of the many questions a platoon commander should ask himself on taking over a trench, and at frequent intervals afterwards:

1. I am here for two purposes—to do as much damage as possible to the enemy, and to hold my part of the line in all circumstances. Am I as OFFENSIVE *as I might be with organized sniping, rifle grenades and patrols? Am I doing my best to make "No Man's Land" our land? Am I doing all I can to make this line as strong as possible? Have I done all I can for the comfort and safety of my men?*

2. Do I study as much of the enemy's country as I can see, and do I realize the importance of reporting *at once* anything I see or any information I obtain, and do I carry this out and always have a runner ready to convey the message?

3. Have I pointed out to section commanders the portion of the enemy's trench they are responsible for keeping under fire, and where his loopholes are?

4. What points in front particularly require patrolling at night?

5. Do I connect up all right with the platoons on my right and left? Do I know the position of my nearest support? Do all my men know the position of Company and Battalion Headquarters and the Battalion Aid Post and the best routes to those places?

6. Does every man know his firing position, and can he fire from it, over the parapet, at the foot of the wire? Are there any machine guns or Lewis guns in my sector? What is their arc of fire? Is my front covered by enfilade machine gun or Lewis gun fire; if so, from where?

7. Do all my men know their duties in case of attack? If the enemy succeeds in breaking into my line at any point, how can I best arrange for counter attacking him? Do I thoroughly understand the Company and Battalion Defense Scheme, and have I explained it to all my N. C. O.'s.

8. Do I do my best to prevent men exposing themselves needlessly? Have I ascertained and warned all my men of the places in my part of the line, including communication trenches, which are exposed to the action of hostile snipers, and have I taken steps to remedy this?

9. Are my sentries in the right places? Are they properly posted by N. C. O.'s? Are the orders explained to each sentry as he is posted, and am I sure that he understands them? Are they posted in the best possible places so as to see well and easily, and have they enough periscopes?

10. Where are my listening posts? Are my listening patrols properly posted?

11. Do I know the orders regarding the use of the S. O. S. signal?

12. Are the arrangements in case of gas attack complete and known to all ranks? Where is the gas alarm, and does it work? Do my sentries know the orders as to sounding the gas alarm?

13. Have my men always got their gas helmets and box respirators on them, and are they in good order and

properly fitted? Do they know how to put them on and use them?

14. Are the arrangements in case of bombardment complete and known to all ranks? Have I practiced the rapid evacuation of my dugouts and manning of my line in case of an enemy attack? Are there some picks and shovels in each of my dugouts?

15. Are all my rifles, ammunition, and bombs clean and in good order? Have all the men got rifle covers and do they know when the covers should be on and off the rifle? Are the magazines kept charged? Have the men got rifle oil, pull-throughs and cleaning material?

16. Where are my S. A. A. and bomb stores? Are they properly labelled and is their position known to all the platoon? Are they under cover from the weather? Do I know the position of the vermorel sprayers, mine shafts, trench mortars, mechanical bomb-throwers, rifle batteries, artillery O. P.'s and telephones in my vicinity? Do I keep a list of trench stores in my charge and see there is no waste of them? Do I and my N. C. O.'s inspect trench stores, S. A. A. and bomb stores as often as we should? Are all the bombs detonated? Will all the wooden lids of Reserve S. A. A. boxes draw out easily, and are the seals of the tin linings unbroken? Where is the nearest R. E. store?

17. Am I doing constant work on my wire? Do I know where my men can get through, and are there easy means of exit from my trench close to those places? Do I know what gaps there are in the enemy's wire, and am I doing my best to prevent the enemy repairing them?

18. Are my parapets and traverses really bullet-proof everywhere?

19. Are my parapets, traverses, fire steps and dugouts properly revetted? If not, how can I make them secure at once? Do I ensure that no undercutting of the parapet or parados takes place?

20. Are my trenches as dry as I might make them? Are they trench-boarded?

21. Is there an N. C. O. always on duty? Do I take him with me on my rounds? Does my platoon sergeant know everything he should, so that he can take my place if I become a casualty?

22. Am I always the first man out at "stand to," and do I see that every man is at his post?

23. Do I and my platoon realize that it is our duty to leave our trenches and dugouts, when relieved, in a better state than we found them?

24. Do I always check at once any tendency to slackness and slovenliness on the part of my men in carrying out their duties?

25. Are my men as comfortable as I can make them? Are there enough dugouts for them all? Do they get *hot* soup and tea from the trench cookers? What can I do to make them more comfortable? Do I always see that the rum is correctly issued? Do I organize my men's work in proper reliefs and are proper duty rosters kept? Do I ensure that, as far as possible, my men get sufficient sleep?

26. Are the trenches as clean and sanitary as they might be? Are live rounds and cases properly collected? Are my bags for refuse and empties in position? Is earth or chloride of lime

used in the latrines? Are the latrines clean and properly looked after?

27. Am I doing all I can to prevent my men getting "trench feet?" Has every man a spare pair of dry socks, and what are the arrangements for drying socks? Do my men wear gum boots when it is not necessary?

28. Are my men drinking water from any but authorized sources? Are my men's water-bottles clean and full? Have I enough petrol tins for water?

29. Are the orders as to wearing equipment carried out?

30. Are my men using notice boards, floor boards or wood from the defenses or stores as firewood?

31. I am here for two purposes—to do as much damage as possible to the enemy, and to hold my part of the line in all circumstances. Am I as OFFENSIVE *as I might be with organized sniping, rifle grenades, and patrols? Am I doing my best to make "No Man's Land" our land? Am I doing all I can to make this line as strong as possible? Have I done all I can for the comfort and safety of my men?*

If Not, Why Not!

The following items are included in the urgent deficiencies appropriations for the fiscal year ending June 30, 1917, also in the appropriations for the support of the Army, for the fiscal year 1918.

Under regular supplies, Quartermaster Corps:

For furnishing heat and light—for the *authorized allowance* of quarters for officers, including members of the Officers' Reserve Corps when ordered to active duty, and enlisted men, including enlisted men of the Regular Army Reserve, and retired enlisted men when ordered to active duty.

Also the following under the heading "Barracks and Quarters:"

For rental of the *authorized allowance* of quarters for officers, including members of the Officers' Reserve Corps when ordered to active duty, on duty with troops at posts *or stations* where no *public quarters* are available.

The appropriations bill for the fiscal year 1918 contains the following:

For commutation of quarters and of heat and light to commissioned officers, members of the Nurse Corps, and enlisted men on duty at places where no *public* quarters are available, including enlisted men of the Regular Army Reserve and retired enlisted men when ordered to active duty, $1,100,000.

Random Thoughts

We are living from day to day, recognizing the difficulties under which all departments of supply and superiors are laboring, working hard with what we can get, and doing good work, but with it all we all have the feeling that the present system will not and cannot last. To run a great war and handle the great questions of supplying large bodies of troops and handling masses of troops, it seems to us all that decentralization must in some way be worked out, the department commanders given more authority, and the War Department in Washington become the directing head instead of an office of record for every small detail. However, that is not our business, and we are sticking close to our legitimate work of training officers, but it is something to think over.

* * *

Simplification of paper work is another question we are all glad to see you taking up. Under the present paper work, with a two or three years' war, it will take twenty years to clear up the records.

We are all proud of the JOURNAL. It is fine, and doing great work.

* * *

The influence of the Infantry Association on the service and on national military opinion has been very great, and it has lifted the Infantry branch from an apologetic attitude to its proper position as the main fighting branch, with its officers taking second place to none in military knowledge, ability, and influence in the service.

The Infantry Association publishes a monthly magazine, the INFANTRY JOURNAL, containing articles of great military value, particularly on infantry subjects, and which will, alone, and with no other military library, keep one well abreast of the times.

* * *

I also wish to congratulate the Association on the ever-increasing excellence and absorbing interest of the INFANTRY JOURNAL and of which, since transferring to another branch of the service, I have heard from members of this branch nothing but expressions of appreciation and convictions that it was by far the best of the service publications, in which I heartily concur.

Casualties among Medical Officers

The surgeons of England and France need help both at home and in the field.

"English physicians have given themselves to the army so freely," says Col. T. H. Goodwin, R.M.C., "that in some of the more populous districts there is but one physician for 6,000 people left in England.

"The English surgeons have worked desperately. They frequently, after great military engagements, keep their boots on for a week at a time, working fourteen and sixteen hours a day. But they have learned their lesson; and where at the war's inception they detailed twenty medical officers and assistants to care for the sick and wounded in 500 beds, now with the aid of two more officers they give equally good care to a thousand."

Colonel Goodwin, who has been through the war, beginning with the first expedition to France, and the great retreat from Mons, has been detailed to lend his great experience to the United States Medical Corps, and he unfalteringly advises the greatest possible number of medical officers at the earliest date. He flatly contradicts the story that 60,000 English doctors have lost their lives in the service, the total loss not being 2 per cent of that number. There are only 12,000 surgeons in the English Army.

Names

Not so many weeks ago our newspapers were telling us how to pronounce the name of Marshal *Joffre*, and other members of the French Mission. It is altogether fitting that the Paris papers should do as much for their readers.

PARIS, June 14.—In their columns of description of the arrival of General Pershing and his staff the Paris newspapers find room today to enlighten the public on the proper pronunciation of the general's name—a name which, as the *Figaro* says, is "not one easily enunciated in the accent of Montmartre."

There was much diversity in the pronunciation among the populace, the favorite rendering being "Pareshang." But, adds the *Figaro*, "it will be common knowledge today that the name of the American general who comes to fight beside our soldiers is pronounced 'Peurchigne.'"

Editorial Department

How to Maintain Our Families

The practical reduction of officers' pay, by the expedient of keeping them detached from their so-called permanent stations for periods of years, and in not providing the authorized allowance of quarters in kind where they can maintain their families near them, is one of the greatest hardships married officers now endure.

The law provides that officers shall be furnished with adequate quarters in kind or be paid commutation for their *authorized allowance* in lieu thereof. A compliance with the spirit of the law is the least the Government can do, and the cost of rental of suitable quarters or the payment of commutation should be borne by the Government and not be forced upon individual officers. It seems to be a question of administrative action only and should not be further avoided. It should apply equally to both line and staff and without consideration as to what was an officer's status when ordered to field duty.

For the past five years line officers on "temporary" duty on the border have been separated from their families or, under favorable circumstances, have had them with them only by renting a room or rooms at exorbitant rates and paying for the same out of their own pay, which is already insufficient. Our pay has not increased with the high cost of living, but has been reduced by reason of such expenditures, which, in normal times, are met by the Government in providing us quarters at posts.

Paragraph 668, Military Laws of the U. S., ed. 1915, provides:

668. Commutation of quarters, rate.—That at places where there are no public quarters commutation therefor may be paid by the Pay Department to the officer entitled to the same at a rate not exceeding twelve dollars per month per room. Act of March 2, 1907 (34 Stat., 1169).

Paragraph 672, Military Laws of the U. S., provides:

672. Same—Not to lose right on account of temporary absence.—Hereafter officers temporarily absent on duty in the field shall not lose their right to quarters, or commutation thereof, at their permanent station while so temporarily absent. Act of February 27, 1893 (27 Stat., 480).
(Covered by Paragraph 1302, A. R.)

Paragraph 1307½, U. S. Army Regulations, provides:

1307½. An enlisted man on duty at a place where there are no public quarters available may, when specifically authorized by the Secretary of War, be paid commutation of quarters at the rate of $15 per month, in lieu of hiring quarters for him at government expense. (C. A. R., No. 28.)

If an officer or his family is not able to use quarters in a post, they must be provided for elsewhere by commutation. The same applies in the case of an enlisted man with a family. It is not fair nor advisable to force an officer to keep his family at some ungarrisoned post several thousand miles away for indefinite periods extending into years, as is now done.

It is urged as a matter of justice that any officer or enlisted man with a family dependent upon him, who is entitled to quarters, but is not actually provided with quarters in kind, be paid commutation of quarters, heat and light, in lieu thereof (as now plainly prescribed by law), without regard to the character of duty he may be performing. Also, that under such circumstances the occupation of a tent or cantonment quarters by an officer in the field be not regarded as public quarters within the meaning of the Act of Congress. This is a regulation only and not law. (See par. 672, Military Laws above.)

As the pay of officers and enlisted men, when in a post with quarters provided, is barely sufficient, it may be readily imagined how seriously financially embarrassed are those who have been paying house rent for their families during the border trouble and now on a greater scale during the war with Germany.

¶

Universal Service vs. Volunteerism

A peaceful revolution! No less a phrase will express the significance of the marvelous outpouring on June 5 of nearly ten million of the youth of America to register their readiness to serve their country on the battlefield or wherever their country sends them.

The clamor of the professional and pro-German opponents of the selective draft ended in a ridiculous fiasco. What a contrast this noiseless and matter-of-fact Call to Arms offers to the old, feverish drum corps methods of volunteering(?)! No exhortation. No artificial enthusiasm. No poster advertising. No mass hysteria. Only the quiet pressure of a law of universal incidence, democratic in form and spirit, and therefore respected by those who are to bear its burdens.

No greater triumph for the principle of universal and obligatory service could be imagined than this sober and cheerful acceptance of it, by a nation which less than a year ago seemed wedded to the noisy, haphazard and inequitable volunteer theory.

All that romantic nonsense to the effect that democratic America would not submit to such a law has now been exploded. With a calmness and a whole-hearted appreciation of the value and equity of universal service, every man who registered has dedicated himself to service—a service which he knows is necessary and which he will perform all the more faithfully because he realizes that it is distributed intelligently and equally.

In this war our country is more united in feeling than in any other of its wars, with the possible exception of the war with Spain.

Owing to our absolute unpreparedness the draft expedient was necessary and was resorted to as a war measure, but out of it will inevitably develop a system of universal military training and service that will prove the most nationalizing and democratizing force ever operative in the United States.

How much better and wiser to have had two million young men trained, officered, equipped and ready for service now, instead of a year from now. Such a universal training and service law should be enacted without delay and is bound to be the outcome of our present unpreparedness. We may not again have half the world in arms standing between us and the enemy to protect us while we prepare.

Auto Infantry

The development of the flying machine and the automobile has revolutionized means and methods in both peace and war. The horse is gradually disappearing in business pursuits and is also gradually disappearing in warfare. The great European War and our own recent experiences and experiments have demonstrated conclusively that preparation for the infantry attack must be made by lavish expenditure of ammunition and that the most effective and mobile modern troops are infantry equipped with auto transportation and aided by aeroplane observation and fighting.

We should profit from the lessons to be learned in Europe and should organize and equip our forces along modern lines. We Americans claim to be the most up-to-date people in the world and we are individually, but not nationally. It is understood that the Government has recently purchased a number of auto trucks for troop transportation. Their number, however, should be greatly augmented. The extensive use of motor busses by the Allies proves this conclusively.

By the use of auto transportation we can with rapidity and comparative ease deliver, in excellent condition, near to the firing line and quickly into action, the largest force of that arm by which all battles are won—the unpretentious, straight-shooting, bayonet-fighting, bomb-throwing Infantry. The same arm which is now, regardless of nationality, giving and taking the short-range blows and carrying the trenches on Europe's blood-soaked battlefields.

Φ

Pelion upon Ossa

There were two mountains in ancient Greece that mythical giants were said to have placed one upon the other in an attempt to reach Olympus, the abode of the gods. So through the centuries we have been "piling Pelion upon Ossa." This is what is happening in the military world of today in the publication of books. The stack will soon be high enough to reach Olympus and beyond. Every man who by any chance was ever an instructor in a military school, with the national guard, or, best of all, at one of the Plattsburg camps, is rushing into print with alleged authorship, though it were trite to dignify much of the work by the name of authorship, because most of the books to which we refer are nothing but compilations, and compilations of the simplest sort at that—merely the collection of a few well-known manuals. These are reset in uniform type, given a high-sounding title, an extravagant price-mark, and launched upon an unsuspecting if not expectant public. We have them galore: "Notes of a Non-Com," "Suggestions of a Subaltern," "Papers of a Plattsburger," "Review for Reservists," and what not. "Outpourings of an Officer" is still unpublished.

And the price of these simple compilations, some of them mere photographic copies of government manuals! We dislike to say it, but, really, the prices are almost scandalous. They range from $2 to $6 each, and we actually know that in some instances the cost of production cannot be more than 15 cents a copy.

In our college days it used to be commonly said that on the adoption of a new text-book the learned professor blossomed out in a new suit. Not that he didn't need the new clothes, bless his dear, old heart! but we used to wonder at times if there wasn't some other or better way for him to acquire the needed

haberdashery without the source being so apparent.

So it is today. These compilers may need the money. We haven't a doubt that they do. Probably no easier way within the law can be found for the sudden acquisition of wealth, but let us call a halt on this useless "carrying of coals to Newcastle." The need for the immediate and intensive training of large numbers of men is responsible for the sudden influx of books. But, after all, is not our War College capable of preparing a satisfactory course and furnishing the essential books? Why, then, this volunteer assistance?

The Secretary of War has very properly promulgated an order that during the war no books shall be purchased by the War Department where on officer is the beneficiary. It might have been better had the inhibition been directed at some of the individuals who were clearly overstepping the bounds of propriety in the gold-bricks they were foisting on the unenlightened officers, leaving the deserved fruits of their toil to the limited number of officers who had really written worth-while books.

Our remarks are not addressed to this type of real author, the man who after his day's routine is over seeks the seclusion of his quarters, there to steep his mind in standard military works and laboriously pen his own comments thereon and set forth his own valuable experiences for the benefit of those of us who have not the opportunity or the patience to delve deep into the maxims of a Napoleon or the strategy of a Caesar. This laborer is fully worthy of his hire. But everything in this world is compensatory. Some "authors," a little late in the field, are bound to be disappointed when they receive their quarterly statement of "royalties," and some publishers, we fear, are going to have debit entries on their profit and loss accounts when they come to balance their books. And must we confess it? No tears will be shed in this sanctum!

¶

At the Threshold

We are proud of the men who are undergoing the hard and intensive work in the various training camps for officers. The conclusion of this training promises to result in a fine body of young officers, in the beginning, of course, principally as lieutenants and captains for the National Army. Men who will be well grounded in the primary duties as a soldier, but with such a foundation that they will be in position to add constantly to their knowledge of the military profession.

These young men undoubtedly realize that when they have finished their present camp work they will have but completed the elemental training of an officer, and that only close and continual study and application will enable them to be the leaders of men which the country expects and demands.

Situated as we are we had rather exceptional opportunities to meet many of these young men before they entered upon their course of training. We are free to confess that at first the impression was strong upon us that many of them were seeking positions as officers for reasons far from being unselfish; that the lure of rather high compensation for youngsters was before some of them. We were wrong. Our first impressions were not accurate. The spirit in which these fine American boys have

gone about the really hard work of training has forever set at rest any such false conception of their motives. We will hear more of these men; later they will wear the oak leaves and perhaps the silver star of rank. But we shall not envy them their rapid rise; they will have deserved it.

More Teamwork Needed

On the first page of the JOURNAL appears each month a standing request for our members and subscribers to send us articles for publication. To this few pay any attention. It must be apparent to all that the most essential thing in the production of an interesting magazine is *copy for publication* and that it should be of timely interest.

Editing the JOURNAL is a labor of love, and it cannot be expected that, in addition to our multitudinous other duties, we shall be able to produce original articles for publication. It is impossible. Therefore, keep up your interest in the Infantry welfare and send us your views on any subject for our assistance in selecting matter for publication, and, most important of all, write for publication articles on any subject you are most familiar with.

We wish to represent the professional thought of the Infantry, but no one person can produce a magazine which will be continuously interesting or which would not be confined in its viewpoint.

This is a most interesting and critical period in the development of the Infantry and of the Army as a whole. Send us tactical notes, your experiences in training the new army and new officers; views on equipment, uniform, quarters for our families when we are not on duty at posts, etc.; also photographs and kodak pictures.

This means *you*, so get busy with your pen. We need your help for the next and each succeeding issue.

Night Operations

A Department devoted to the interest of newly commissioned Infantry Officers, Officers of the Infantry Officers' Reserve Corps, and candidates for Commission.

Conducted by Capt. W. H. Waldron, 29th Infantry

MILITARY TOPOGRAPHY AND MILITARY MAP READING

For admission to the Officers' Reserve Corps or promotion to a higher grade in that corps, the provisions of General Orders No. 32 require of the candidate the making of a military topographic map (sketch) and a practical knowledge of map reading.

In the space available for this article it is impracticable to provide a text containing the process of military map (sketch) making. To give you a few hints that will help you over some of the rough places and to inform you where the detailed information on subject may be obtained is all that will be attempted.

The United States Infantry Association are the publishers and distributors of a book written by Capt. Loren C. Grieves, 30th Infantry, for the instruction of noncommissioned officers of the Army on the subjects of Military Sketching (which is, so far as you are concerned, the same as topographic map making) and Map Reading. This book is written in progressive lesson form and provides a text from which you will be able to master the subject within a reasonable length of time. The book may be had from the United States Infantry Association, Union Trust Building, Washington, D. C. The price is $1.00, postage paid. This book is highly recommended by the editor of this department.

The making of a military sketch may be accomplished in only one way, and that is to "go out and make it." You will never gain a mastery over the subject by sitting at your desk and studying the text-book. You will have to get out in the country and go through the process, not one but many times.

As in any other line of endeavor the first requisite for success is the possession of the proper tools for the work. If you start out with makeshifts, you are doomed to discouragement and failure.

1. You must have a drawing board, upon the surface of which the paper on which your sketch is to be drawn may be attached. The book department of the Army Service Schools at Fort Leavenworth, Kansas, has devised a sketching board that has met the requirements at that institution. It has a 3½-inch declinator and is probably the best that can be produced for a moderate price. The price of this board complete is $5.50. A folding head tripod for the board costs an additional $2.75.

2. Your next requisite is a means for attaining the direction of one point from another. This is supplied by the alidade ruler upon the six surfaces of which your scales may be pasted. The book department of the Army Service Schools at Fort Leavenworth also supplies this instrument at a cost of 20 cents each. It is made of seasoned wood, weighted with lead so that it will lie flat on the surface of the paper and not be disturbed by wind. It is triangular shaped in cross-section and is about 6 inches in length.

3. You will require some method for determining the slope of the ground at any given point and the difference in elevation of any two or more points. This is accomplished by reading the vertical angle. The regular instrument designed for this purpose is the clinometer, which is very expensive. As a substitute we use the slope board. On pages 43 to 45 of Captain Grieves' book are detailed instructions for laying off a slope board on your ordinary sketching board described in paragraph 1 above. You will find this sufficiently accurate for all practical purposes.

4. You will need lead pencils—4H and 6H are the best—a soft rubber eraser, thumb tacks and sketching paper. This latter should be carefully selected, for you cannot accomplish the necessary "rubbing out" on inferior paper.

5. Finally you will require a scale of paces, which will be considered in detail later. As a refinement I would advise your procuring a canvas pencil holder.

Now let us see what all of this is going to cost you:

1 sketching board	$5.50
1 tripod for sketching board	2.75
1 alidade scales with stride and pace sheets	.20
1 eraser, soft rubber	.10
2 pencils, lead, 4H	.15
1 roll paper, sketching (20 yds.)	.65
1 pencil holder, canvas	.30
Thumb tacks, 2 dozen	.20
1 triangle, ambro, 6 inch (30 to 60).	.20
1 text-book, Captain Grieves'	1.00
Total cost	$11.05

All of these items except the last may be procured by addressing a letter to The Secretary, Army Service Schools, Fort Leavenworth, Kansas; the latter by addressing the United States Infantry Association, Union Trust Building, Washington, D. C.

You will need every one of these articles. To go out without them means unsatisfactory work and discouragement. This is a good outfit and one that you will use in the course of your instruction work in topography at the summer training camps for Reserve Officers. You will find it one of your best friends in the prosecution of your work there, and you will find it handy in your solution of tactical problems incident to the tactical walks in minor tactics that you will have, especially where you have an opportunity to indicate your dispositions by the means of a rough sketch.

In studying the subject, go over each lesson as laid down by Captain Grieves. They have been carefully planned. Get the elements of each firmly fixed in your mind. Practice the making of the conventional signs until you do not have to refer to the text-book for them. Get out in the country and actually make a map in accordance with the rules laid down in your text-book.

MILITARY MAP READING

Q. What is a military map?

A. A military map is one which shows the relative distances, elevations and directions of all objects of military importance in the area represented.

Q. What is map reading?

A. The ability to correctly interpret a map and to form a mental picture of the ground it is intended to represent.

Q. What are the essential elements of map reading?

A. 1. The conversion of map distances into corresponding ground distances; that is, an appreciation of the scale of the map.

2. A knowledge of the conventional signs and symbols employed by the map makers to represent the topographical features of the country included in the map.

3. An appreciation of direction.

4. A knowledge of contours and what they are intended to represent.

Q. What is the scale of a map?

A. The scale of a map is the ratio of the distance between two points on the map divided by the horizontal distance between the corresponding points on the ground.

Q. What are the scales prescribed for military maps in our service?

A. 1. Three inches equal one mile, for road sketches and maps.

2. Six inches equal one mile, for position sketches and maps.

3. Twelve inches equal one mile, for maps and sketches on which it is intended to organize defensive positions.

Q. How may the scale of a map be expressed?

A. 1. By a plain statement in words and figures of the relation between the map distance and the ground distance; for example," 3 inches to 1 mile." This means that any 3 inches on the map measured in any direction will represent 1 mile on the ground.

2. By a representative fraction in which the enumerator represents the map distance and the denominator represents the ground distance in the same unit of measure, thus $\frac{1}{10,560}$ would be the representative fraction for 6 inches to 1 mile; that is, one unit of measure on the map, as 1 inch, would represent 10,560 inches on the ground. One pen-

cil length on the map would represent 10,560 pencil lengths on the ground.

3. By a graphical scale in which a line is drawn on the map and divided into equal parts, the divisions being marked, not with their actual lengths, but with the ground distance that they represent.

Q. What are the two classes of scales?

A. Working scales and reading scales.

Q. What are working scales?

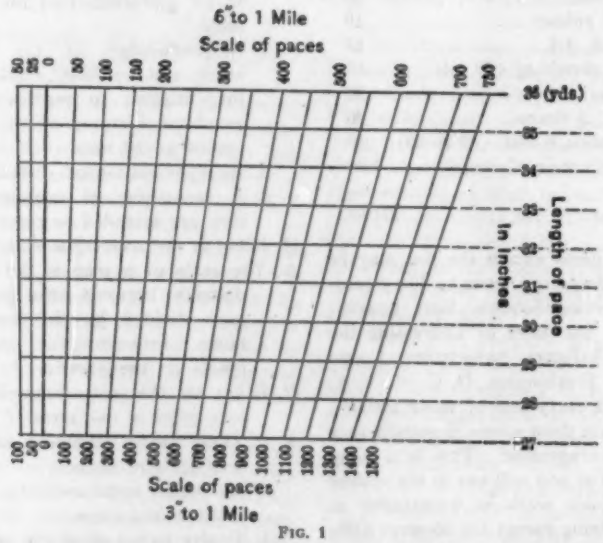


FIG. 1

A. Working scales are those representing the unit of measure with which the map was made; that is, paces, strides of a horse, length of a rope, etc.

Q. What are reading scales?

A. Reading scales are those made for laying off distances on the map and should be in some familiar unit of measure such as yards or feet. In some cases the reading scale may be identical with the working scale as where the working scale is paces of 36 inches, the corresponding reading scale would be yards.

Q. How would you determine the distance between two points on a map?

A. By measuring along the edge of a piece of paper the distance between the two points under consideration and applying this distance to the scale of the map and reading directly from it. To measure the distance from one point to another along a winding course, place the edge of the paper along each stretch, placing the point of a pencil at each successive poipt where the direction changes, the paper may be twisted around to follow the bends of the course until the total distance has been covered. Apply this total distance to the scale of the map and read direct. A few trials at this will perfect you in the method.

Q. What is a convenient formula for the solution of scale problems?

A. Let m = the number of units of measure to be represented by the scale line. In linear scales make this always 2,000, so there is nothing further to remember.

Let p = the number of inches in the unit of measure. For a scale of yards p would be 36, for a scale of 30-inch paces p would be 30, for a scale of meters p would be 39.37.

Let n = the denominator of the representative fraction. For 3 inches to the mile n would be 21,120; for 6 inches to the mile n would be 10,560, for 12 inches to the mile n would be 5,280.

Let x = the number of inches in the scale line to represent m units of measure.

Then $\frac{m \text{ times } p}{n} = x$.

For example: You desire to construct a scale of paces of 30 inches at 6 inches to 1 mile.

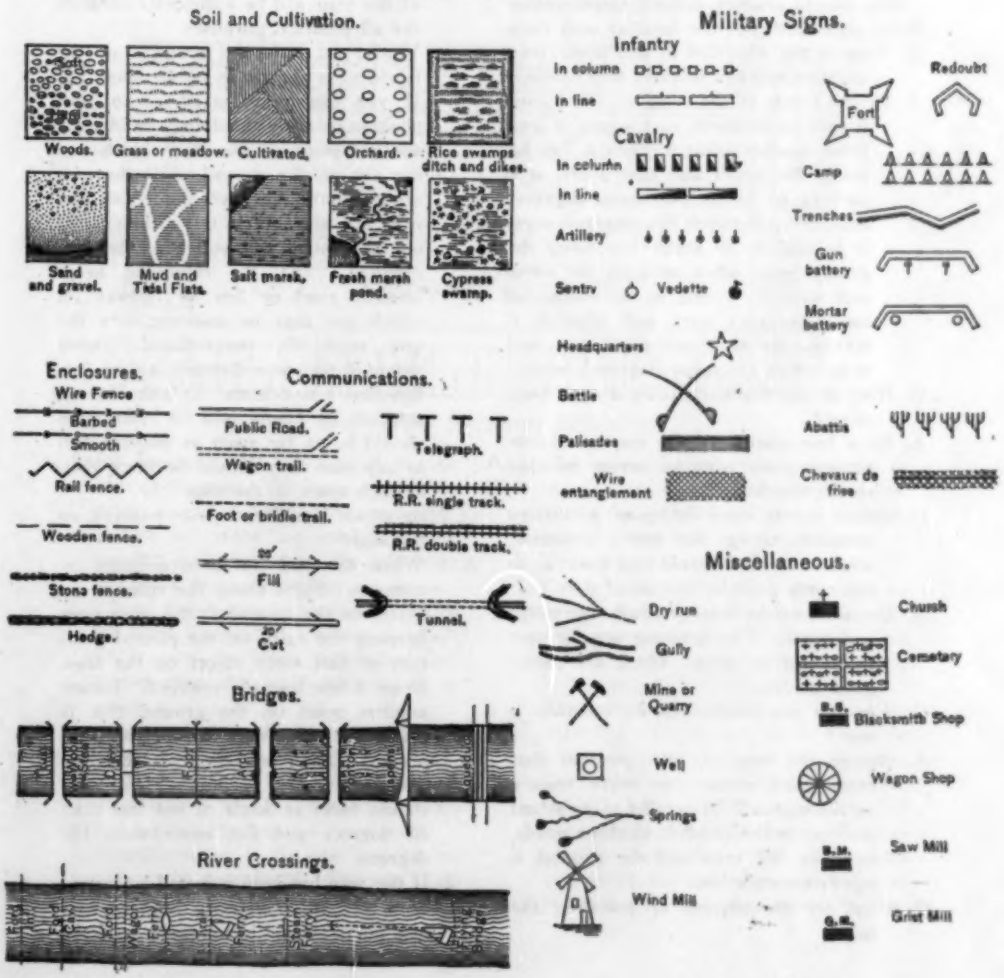
$m = 2{,}000$; $p = 30$; $n = 10{,}560$.

$$\frac{2{,}000 \times 30}{10{,}560} = x = 5.68 \text{ inches.}$$

Therefore a line 5.68 inches long would represent 2,000 paces. Draw a line 5.68 inches long and divide it into five equal parts of 400 paces each. Divide the left part into four equal parts each representing 100 paces.

Except as a means to your understanding of scales it is not necessary for you to go to the task of the solution of scale problems. All text-books on military sketching have all the scales that you will ordinarily use in your practical work. Figure 1 shows scales of paces from 27 inches to 36 inches for 3 inches to 1 mile 6 inches to 1 mile. This is all you will ever have any use for. (Taken from the Engineers' Field Manual.)

CONVENTIONAL SIGNS AND SYMBOLS



Q. How are the features of the country represented on maps and sketches?

A. By means of conventional signs and symbols.

Q. What characteristics have these conventional signs and symbols?

A. They are drawn to resemble, as near as practicable, the features that they are intended to represent.

There are published herewith plates of the ordinary conventional signs and symbols employed in map and sketch making in the United States service. In hasty sketches soil and cultivation may be indicated by simply writing the same in the areas instead of putting in the conventional signs. (See p. 66.)

You should practice making these conventional signs until you are familiar with them.

Q. How is the direction of one point from another stated in military map reading?

A. By the points of the compass. One point is said to be north, east, south or west from another point. When it lies between the north and east points it is said to be north (so many degrees) east; when between the east and south it is said to be south (so many degrees) east; when between the south and west it is said to be south (so many degrees) west, and when it is between the west and north it is said to be north (so many degrees) west.

Q. How is the north point of a map indicated?

A. By a line placed on the map at a convenient place with an arrow pointing to the north.

Q. Should a map come into your possession without having the north indicated, what conclusion would you draw as to the north point of the map?

A. The sides of the map generally run north and south. The lettering usually runs from east to west. These are pretty good guides.

Q. What do you understand by orienting a map?

A. Placing the map in such position that every road, stream, or other feature on the map will be parallel to its actual position on the ground; in other words, to make the map and the ground it represents coincide.

Q. What are the objects of orienting the map?

A. To enable you to pick out and identify on the ground all the features shown on the map.

Q. By what methods may a map be oriented?

A. 1. When the map has a magnetic meridian on it: Place the north and south line of the compass parallel to the magnetic meridian and turn the map until the north end of the needle points to the north of the circle. If the true meridian only is shown on the map you must know the declination and make allowance for it. If the declination is not more than 4 or 5 degrees the orientation on the true meridian or along the up and down borders of the map will be sufficiently accurate for all practical purposes.

2. When you have no compass or the meridian is not shown on the map: (*a*) If you can locate on the map your position on the ground and can identify another place on the map which you can see on the ground, shift the map around until the two points on the map are aligned on the distant point on the ground and you have the map oriented. (*b*) By reference to a straight road or line of railway on which you may be standing turn the map until the conventional symbol points in the same direction as the feature that it represents. In both of these methods the points used for orientation should be as far apart as possible and in any case they should be more than an inch apart on the map.

Q. How would you locate your position on the map?

A. 1. When the map has been oriented by compass. Sight along the ruler at an object on the ground at the same time keeping the ruler on the plotted position of this same object on the map. Draw a line towards yourself. Locate another point on the ground that is plotted on the map and repeat the process. The intersection of these two lines is your map position. These lines should form an angle of not less than 30 degrees and not more than 150 degrees.

2. If the map has been oriented by means of a straight line drawn between two map points, it will be necessary to draw

but one line from an object on the ground, and the intersection of this line with the line already on the map will be your location on the map.

Q. What are contours?

A. They are lines cut from the surface of the earth by imaginary horizontal planes spaced at equal vertical intervals from each other.

Q. What do contours show?

A. 1. The relative elevation of all points on the map.
2. The slope between any two points on the map.
3. The shape and form of the ground included within the limits of the map.

Q. What general characteristics have contours?

A. 1. All contours join or extend to the edge of the map. When they join they either represent a hill top or a depression—a hill when the smallest closed contour is higher than the adjoining one and a depression when it is lower.
2. Where the contours are equally spaced the slope is uniform. Where they are wide apart the slope is gradual and where they are close together it is steep.
3. A watershed is the high ground between two watercourses. The water flows away from it on both sides and is indicated by the higher contours bulging out towards the lower ones.
4. A watercourse is the low ground between two watersheds. The rain from both sides of it join in one stream and is indicated by the contours bending sharply towards the higher ones.
5. When two contours of different elevations join together and form one line they indicate a cliff. Where a higher one crosses a lower one it is an overhanging cliff.
6. A saddle or col is the space between the summits of two adjacent hills. It is indicated by two contours of greater elevation on two sides of it and two contours of less elevation on the other two sides.

Q. What do you understand by the term "horizontal equivalent?"

A. It is the horizontal distance on the ground between two contours.

Q. What is a scale of horizontal equivalents?

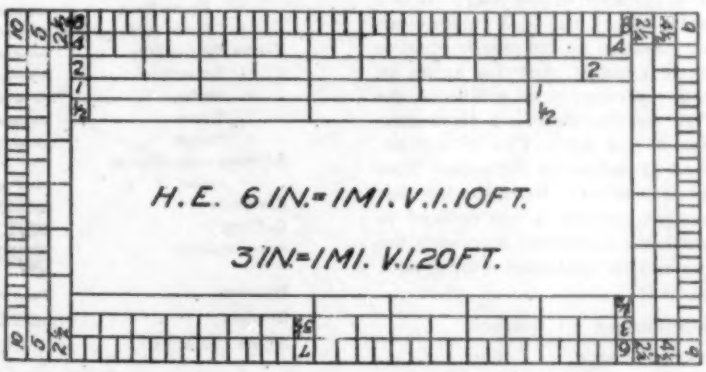


FIG. 2.—Scale of Horizontal Equivalents.

A. 1. The scale of horizontal equivalents is based on the fact that at a slope of one degree the ground will gain an elevation of 1 foot in 57.3 feet.
2. Thus where a vertical interval of 10 feet is being used this 10 feet elevation will be gained in 573 feet, when the slope is one degree. Where the slope is two degrees the 10 feet will be gained in one-half of 573 feet, etc.
3. To construct a scale of horizontal equivalents all we have to do is to first construct a scale of feet for the map. Then determine our vertical interval, say 10 feet. We then measure off successively on a line a map distance of 573 feet; this is the horizontal equivalent for one degree. We next measure off a map distance of 287 feet,

and this is the horizontal equivalent for 2 degrees slope; 191 feet for a 3-degree slope, and so forth up to the maximum degree of slope that we will encounter, usually 10 degrees.

4. This same scale of horizontal equivalents will answer for a map with a scale of 3 inches to 1 mile with a vertical interval of 20 feet; 6 inches to 1 mile with a vertical interval of 10 feet.
5. The scale of horizontal equivalents printed herewith has been made on the principle stated above. It runs from ½ degre to 10 degrees. (See Fig. 2.)

Practical Map Reading

Let us take the map published with this article and systematically read it.

2. What is the scale of the map? It is 3 inches equal 1 mile;[1] that is, 3 inches measured in any direction on the map is equal to 1 mile on the ground. Any 1½ inches on the map will represent ½ of a mile on the ground. We see that there is a representative fraction on the map. This is only another method of indicating the scale. How has it been determined? Remembering that a representative fraction is one reduced to unity in which the numerator represents the map distance and the denominator the ground distance we have:

$$\frac{\text{Map Distance}}{\text{Ground Distance}} = \frac{3 \text{ inches}}{1 \text{ mile}} =$$

$$\frac{3 \text{ inches}}{63{,}360 \text{ inches}} = \frac{1}{21{,}120}$$

This may also be expressed 1 : 21,120; that is, one unit of measure on the map represents 21,120 of the same units of measure on the ground.

Q. What is the distance from the railroad crossing at Goldenville to the Boyd School House via the 621–630–Stock Farm road?

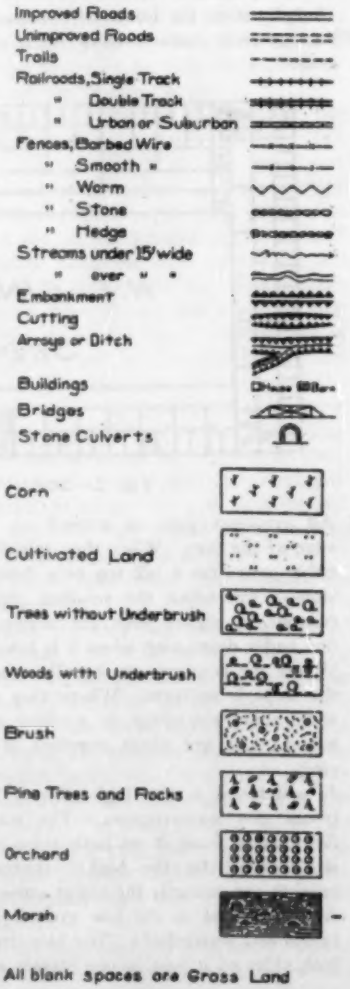
A. Measure off the distance along the edge of a slip of paper and apply it to the graphical scale at the bottom of the map. You will find it to be 4,540 yards.

Q. How long will it take a company of infantry to march from the cross-roads at Hunterstown to a railroad crossing at Goldenville? The company marches at the rate of 80 yards per minute.

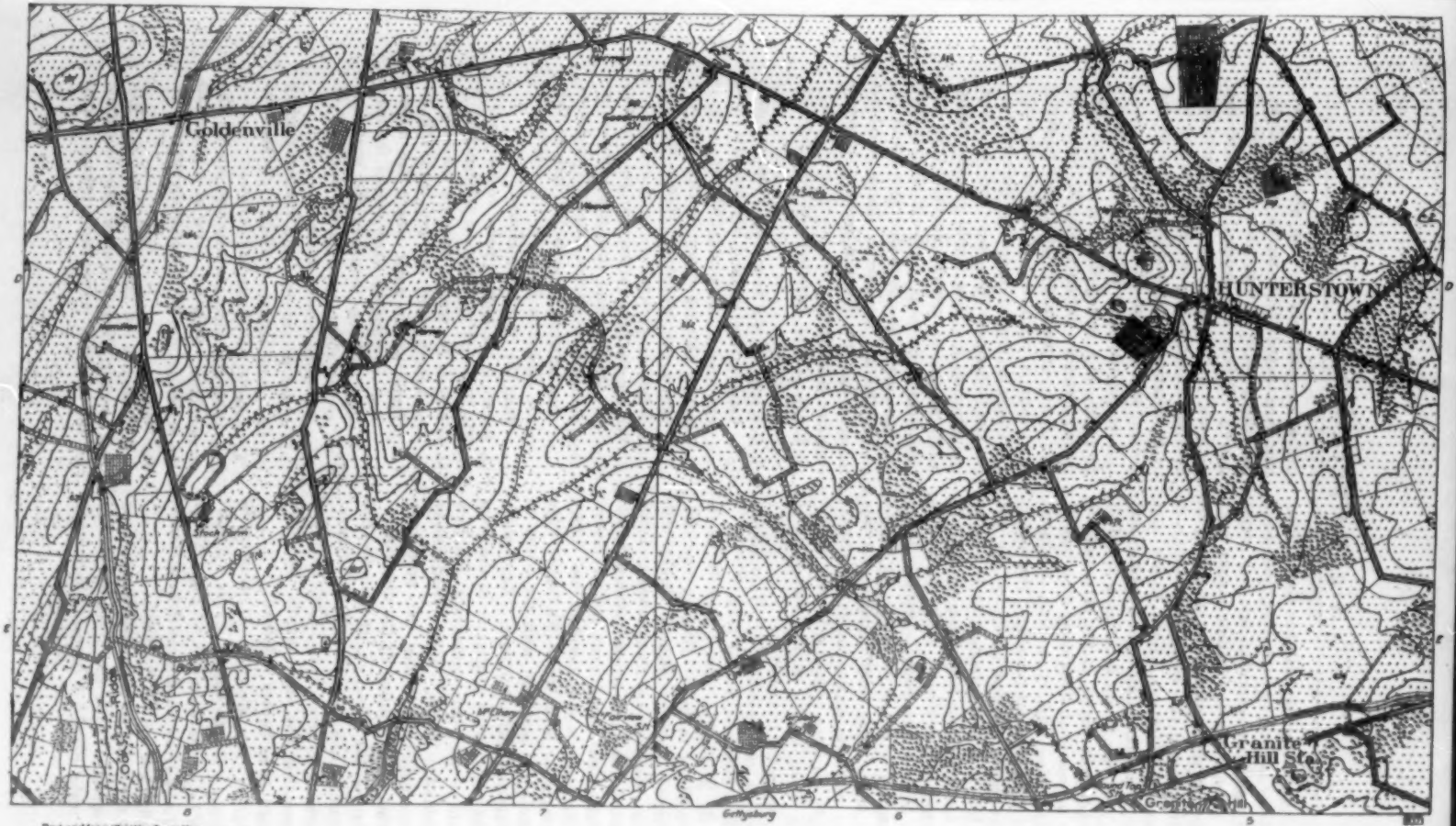
A. By measuring the distance we find that it is 8,230 yards. The company marching at the rate of 80 yards per minute would consume 101 minutes or an hour and 41 minutes.

You now proceed to a study of the conventional signs used by the map maker. These conventional signs are drawn to represent as near as possible the feature as it appears on the ground. The conventional signs employed in making this map are shown below. Make a study of them until you know exactly what every mark on the map is intended to represent.

CONVENTIONAL SIGNS



[1]Reference should be made to the regular Hunterstown 3-inch map as the map given here has been very much reduced and is only for illustration.



Reduced from 12-in War Game Map.
By the Engineer Dept. Army Service Schools
Fort Leavenworth, Kas.

Scale
Mile
Yards
M.D.
V.I.20M.
Datum = mean sea level
1913

In working out problems use the Hunterstown 3-inch map.

You observe that this map has no meridian on it. How are you to determine directions? When a map has no meridian line it is pretty safe to assume that the reading matter runs from west to east and that the up and down edges of the map run north and south. A line through Fairview School House and Goodintent School House runs north and south. This line would serve as a meridian for work in the center of the map and the borders for meridian lines along the edges of the map. You observe a little V-shaped affair at the bottom of the map. The line to the right shows the true north and the one to the left shows the magnetic north; that is, the former, if the map were oriented on the ground, points directly to the north pole and the latter to the magnetic north. There are comparatively few places on the earth's surface where these lines coincide. In this case the magnetic declination is 7 degrees; that is, if you were to take a bearing with a compass there would be a variation of 7 degrees from the true north.

Q. What is the direction of Hunterstown from Fairview School House?

A. North 52 degrees east. This is determined as follows: Draw a line connecting Fairview School House with the cross roads at Hunterstown. Draw another line connecting Fairview School House and Goodintent School House. This latter is your meridian line. Lay a protractor with its 0-180 degree edge along the meridian with the center at Fairview School House. Read along the edge of the protractor to the point where the line connecting Fairview School House and Hunterstown emerges from under the protractor. This is the reading of the direction.

Q. What is the direction of Granite Hill Station from Goodintent School House?

A. South 41 degrees east. Use the same meridian line and pursue the same method as before indicated.

Q. What is the direction of Goldenville from Hunterstown Cross Roads? What is the direction of Boyd School House from Goodintent School House?

A. Work these out for yourself.

Note the Scale of Map Distances of contour intervals. Take the space to the left of the scale marked 1 degree. This means that at any place on the map where the contours are spaced the distances apart indicate that the ground at that point slopes just 1 degree. Where the ground is steeper the contours are spaced close together. By keeping this scale in your mind you can tell by observation the approximate slope of the ground at any point on the map.

Note the statement below the scale, V. I.: 20 feet. This means that the vertical distance between contours is 20 feet. So you know immediately that between every two contours, no matter what their distance apart may be, there is a vertical difference of 20 feet. Suppose the map had no such statement on it. How would you determine this contour or vertical interval? By an inspection of the map. You will observe that the contours from the ridge just south of Goldenville are numbered. These numbers indicate that the vertical interval between contours is 20 feet.

Q. What is the elevation of the Grubey House?

A. We see that this house lies about midway between the 580 and 600 contours; the elevation is, therefore, 590 feet.

Q. What is the difference in elevation between the McElheny House and the Hamilton House?

A. We see that the former has an elevation of 540 feet and that the 640 contour passes through the latter. The difference between these is 100 feet, so that the Hamilton House is 100 feet higher than the McElheny House.

Q. Where is the highest point on the map?

A. The 707-foot hill west of Goldenville.

Q. Where is the lowest point on the map?

A. The lowest point on any map will be found at the point where the largest body of running water leaves the map. This will be found in the southwest sector about 1,400 yards southeast of the Boyd School House.

In order to facilitate the further reading of this map secure a 10-cent package of "Crayolas" and proceed as follows:

1. With the blue crayola line out all the stream lines. This will show at a glance all the water system of the country covered by the map.

2. With the red crayola line out the 560-foot contour. This will show you the outline of the western watershed running along

Oak Ridge and its extension to the north; the watershed immediately west of the main watercourse and that to the east in the vicinity of Hunterstown.

3. With your green crayola line the 500-foot contour. Make note of its crooks and turns which indicate the shape of the ground throughout its course, then compare the green line with the red line indicating the 560 contour. You ought from this process to have a very good idea of the country covered by the map.

Tracing out the water system of the country included in the map we find that the main watercourse runs from northeast to southwest practically parallel to the 549–583–501–543–531 road. Numerous branches lead off to the east and west, the main one to the east crossing the above-mentioned road near 501, where it separates into two branches, one heading in the high ground in the southeast sector of the map and the other in the high ground just west of Hunterstown. The main branch to the west leaves the stream about 1,200 yards due west of 543, runs in a northwesterly direction to a point 700 yards southwest of the Varney place and then turns northeast and runs parallel to the main stream to the Hermon place and forming the watershed lying between the two streams. Another small stream leaves the main stream and heads near the Boyd School House. Another heads near the C. Topper place and runs a little west of south, forming with the main stream and its tributaries the watershed designated as Oak Ridge. Another small stream heads in the vicinity of Goldenville and runs southwest. This and the branches of the main stream form the watershed which lies to the north in prolongation of Oak Ridge. Over in the northeast sector of the map there is an independent system of watercourses that head to the south of and in the vicinity of Hunterstown, and these with the branches from the main stream form the watershed west of Hunterstown.

With your colored map you will be able to pick up all these points. The study should leave you with a good mental picture of the country covered by the map. You should be able to approximate distances and to measure the distance from one point to another with accuracy. You should have a good idea of the vegetation covering the country and how it would look from any point on the map. You should have knowledge of the shape of the ground, the steepness of slopes, etc. You should by an inspection of the map be able to solve the ordinary visibility problems that may come up, and any that do not admit of solution by inspection should be plotted out and a profile of sufficient extent made.

Book Reviews

What a Company Officer Should Know. By Major J. C. McArthur. New York: George U. Harvey. 1917. Cloth, 16mo, 106 pages. Price, $2.00.

This is a short record of Captain X in the military service telling in an interesting way the duties and experiences that befell him in organizing and training Company A, 99th U. S. Infantry, beginning with the time his men reported and taking them through their first hike.

The second half, or appendix, consists of a reprint of G. O. 40, W. D., 1916, "Instruction for Pay Rolls," Model Remarks for Muster Rolls, Correspondence, Model, etc., Individual Cooking and set of forms filled in, usually met in company administration.

This material would serve excellently for several articles in a service journal, and it is not exactly seen what object is gained by making it into a book, nor is it seen why this should be called "The most wonderful military book yet produced," etc., etc., as stated on its cover. The cost seems high. It will be quite a problem for the officers of our National Army as to what they will do with all these new manuals of which this is one, and all telling them "how to do it" when they go into the field. They will surely need more than a 5-foot book-shelf.

Battle Fire Training. By Capts. G. S. Turner and J. J. Fulmer. Menasha (Wisc.): George Banta Publishing Company. 1917. Cloth, Cap. 8vo, 295 pages. Price, $1.25.

A book that can be highly recommended and a valuable addition to any officer's library. It bridges the gap between principles of fire discipline and fire control so generally stated in the Infantry Drill Regulations and gives us a workable plan in detail as to how these principles can be made workable. This book fills a need in our training manuals and if generally used will do much to obtain the uniformity so highly desirable in tactical training of infantry troops. It is a pleasure to find a book that tells how to do something, and really tells it, and the authors deserve the thanks of our service for it. Each infantry organization should use it as a basis for its battle fire training and thus add to its firing line efficiency, which must in the end be the ultimate aim of every military organization, and especially now in these stirring days of war.

Primer for the Officers' Reserve Corps. By Capt. Robert R. Welshimer, C.A.C. Champaign (Ill.): University of Illinois Supply Store. 1917. Paper 8vo, 113 pages. Price $1.00.

This pamphlet is a collection of notes on Administration, Tables of Organization, Military Law, Field Service, Topography, Field and Coast Artillery, Guard Duty, etc.

A compilation, as stated by the compiler, as hurriedly made and for giving information for applicants for commissions in the Officers' Reserve Corps. The information as given is not complete enough and space allotted to various subjects seems disproportionate to their relative values. The cost is excessive.

THE UNITED STATES INFANTRY ASSOCIATION

"The object of the Association shall be to promote the efficiency of the Infantry arm of the military service of our country by maintaining its best standards and traditions, by fostering esprit de corps, by the dissemination of professional knowledge, and by exchange of ideas as to the utilization of such knowledge with particular reference to the rôle of Infantry in modern war."—Article III of the Constitution.

OFFICERS

President:

BRIG. GEN. EDWIN F. GLENN, U. S. Army.

Vice-President:

COLONEL CHARLES S. FARNSWORTH, Infantry.

Acting Secretary:

MAJOR FRED. R. BROWN, Infantry.

Additional Members of Executive Council:

COLONEL PETER C. HARRIS, Infantry.
LIEUT.-COLONEL TRUMAN O. MURPHY, Infantry.
LIEUT.-COLONEL JOSEPH C. CASTNER, Infantry.
MAJOR GEORGE H. ESTES, 20th Infantry.
MAJOR HUGH A. DRUM, General Staff.
MAJOR M. B. STEWART, General Staff.

CONDITIONS OF MEMBERSHIP

All commissioned officers in good standing, or former commissioned officers of honorable record of the regular or volunteer military or naval service including Reserve Corps, and of the National Guard are eligible for regular or associate membership in the Association. Membership dates from the first day of January or July nearest the date of enrollment.

Dues are $1.00 annually, payable in advance. Members may obtain the JOURNAL for $2.00 per year.

All communications should be addressed to the Secretary, the United States Infantry Association, Room 508, Union Trust Building, Washington, D. C. Cable address: Infantry, Washington.

In Union There is Strength

No officer of Infantry can afford to miss the important matter now appearing in the INFANTRY JOURNAL, nor can he afford to loan his personal copy to anyone.

Exery worth-while Infantry officer who takes an interest in his work and in matters affecting the welfare of the Infantry can be depended on to be a paid-up member of the Infantry Association. Membership implies an obligation to work for the Infantry, and the receipt of the JOURNAL is only a part of the benefits derived therefrom.

Only by active cooperation can we protect our interests and better our arm of the service.

Every Infantry officer should not only promptly pay his membership dues, but also contribute his personal aid in every way possible. If in doubt, remit $3.00 and due credit will be given.

The Executive Council tries to carry out what seems to be the consensus of opinion of the Infantry as a whole. Give us your views on all subjects, but do not feel disgruntled if your ideas are not at once carried out. The War Department and Congress move with great deliberation and any desired change must be clearly shown to be for the best interests of the service before it can be considered.

Regimental branches and individual officers (*e. g.*, regimental, battalion and company commanders, adjutants, etc.) should induce officers not now members to join the Association; also prevail upon lukewarm or indifferent officers, who are delinquent in their dues, to pay up.

Some officers pay but little attention to notices of dues sent them and the Council desires to avoid sending such bills through military channels.

If a member, pay up. If not a member, please join at once.

THE INFANTRY JOURNAL
UNION TRUST BUILDING
WASHINGTON, D. C.

Please change my address to:

_____
(Name)

_____
(Rank)

_____
(Address)

New Members

Allen, William G., Captain, Hawaiian National Guard.

Arnold, Howard W., 2d Lieutenant, Officers' Reserve Corps.

Aveilhe, H. H., Captain, Georgia National Guard.

Baldwin, George H., Captain, Georgia National Guard.

Beck, William H., Major, Georgia National Guard.

Brennan, Francis M., 2d Lieutenant, 3d U. S. Infantry.

Brett, Sereno E., 1st Lieutenant, U. S. Infantry.

Brown, Homer, C., 2d Lieutenant, 3d U. S. Infantry.

Butler, John G., Colonel, Georgia National Guard.

Buyington, Robert L., 2d Lieutenant, U. S. Infantry.

Carpenter, James H., Lieutenant, Officers' Reserve Corps.

Cavanaugh, J. Frank, 1st Licutenant, Georgia National Guard.

Cooney, Leo, Lieutenant, Officers' Reserve Corps.

Cota, Norman D., Lieutenant, U. S. Infantry.

Cumming, D. R., 1st Lieutenant, Georgia National Guard.

Dayton, Edwin W., Major.

Deering, C. W. C., Major, Officers' Reserve Corps.

Dieter, George H., 1st Lieutenant, Georgia National Guard.

Dougherty, Frank J., Captain, Hawaiian National Guard.

Draper, W. H., Jr., 2d Lieutenant, Officers' Reserve Corps.

Evans, John L., Captain, Officers' Reserve Corps.

Fawcett, John R., Major, Georgia National Guard.

Fleming, Branch, 2d Lieutenant, Georgia National Guard.

Fletcher, O. K., 1st Lieutenant, Georgia National Guard.

Foss, W. P., Jr., 2d Lieutenant, Officers' Reserve Corps.

Franklin, J. S., formerly 2d Lieutenant, Texas National Guard.

Freeman, George K., Captain, North Carolina National Guard.

Frothingham, H. A., 1st Lieutenant, Officers' Reserve Corps.

Gardner, Alfred W., 1st Lieutenant, Officers' Reserve Corps.

Gary, William T., 2d Lieutenant, Georgia National Guard.

Glass, William G., 1st Lieutenant, Maryland National Guard.

Graddick, Charles D., 1st Lieutenant, Georgia National Guard.

Grant, Ulysses S., Major, U. S. Engineer Corps.

Haile, A. W. M., 1st Lieutenant, Georgia National Guard.

Harris, J. C., 2d Lieutenant, Georgia National Guard.

Harvey, George U., Captain, Officers' Reserve Corps.

Hatfield, Floyd, 2d Lieutenant, 13th U. S. Infantry.

Henderson, Frank D., Major, Ohio National Guard.

Henderson, James F., Captain, Georgia National Guard.

Heywood, Chester D., 2d Lieutenant, Officers' Reserve Corps.

Hilsman, Roger, 2d Lieutenant, U. S. Infantry.

Houser, Orra M., 2d Lieutenant, U. S. Infantry.

Howard, John M., Captain, Georgia National Guard.

Howland, W. A., 1st Lieutenant, Georgia National Guard.

Hutchins, Ralph, Captain, Maryland National Guard.

Ingalls, W. S., 2d Lieutenant, Arizona National Guard.

Iselin, O'D., 1st Lieutenant, Officers' Reserve Corps.

Ketchum, C. H., 2d Lieutenant, Georgia National Guard.

Lawton, A. R., Lieutenant Colonel, Georgia National Guard.

Leonard, Edward W., 2d Lieutenant, 6th U. S. Infantry.

Levy, Isaac C., 1st Lieutenant, Georgia National Guard.

Lewis, Harvey J., Major, Idaho National Guard.

Lewis, R. V., Jr., 2d Lieutenant, Officers' Reserve Corps.

Lonabough, H. E., Major, Wyoming National Guard.

McCabe, M. A., 1st Lieutenant, Georgia National Guard.

McCarthy, T. L., 2d Lieutenant, Georgia National Guard.

Macon, Francis A., 2d Lieutenant, 3d U. S. Infantry.

McCullough, J. H., Major, New Jersey National Guard.

McElmurray, E. H., 2d Lieutenant, Georgia National Guard.

McEwan, John J., 2d Lieutenant, 3d U. S. Infantry.

McGuiness, John J., Colonel, Montana National Guard.

Metcalf, George Price, 2d Lieutenant, Officers' Reserve Corps.

Meyer, Hy. F., Captain, Georgia National Guard.

Minhinnette, J. C., 1st Lieutenant, Georgia National Guard.

Murphey, A. T., 1st Lieutenant, Georgia National Guard.

Neely, Arthur W., Major, Hawaiian National Guard.

Nelson, Jean E., 1st Lieutenant, Officers' Reserve Corps.

O'Leary, Frank, 2d Lieutenant, U. S. Infantry.

Pape, Fred J., 1st Lieutenant, Georgia National Guard.

Pettit, M. S., 1st Lieutenant, Officers' Reserve Corps.

Poland, E. G., 1st Lieutenant, 46th U. S. Infantry.

Ridgway, Matthew B., 2d Lieutenant, 3d U. S. Infantry.

Riker, Herbert L., Captain, Officers' Reserve Corps.

Riley, W. R., Colonel, Hawaiian National Guard.

Ristine, Harold H., 1st Lieutenant, U. S. Field Artillery.

Riter, M. M., Lieutenant, Officers' Reserve Corps.

Safford, Ralph Kirkman, 1st Lieutenant, Massachusetts National Guard.

Saye, Garnett W., Captain, Georgia National Guard.

Seltzer, Lee Hooper, 2d Lieutenant, Maryland National Guard.

Sherman, Robert H., 2d Lieutenant, Georgia National Guard.

Shepardson, Charles N., Captain, Officers Reserve Corps.

Sullivan, R. B., Captain, Georgia National Guard.

Sweeny, Charles, Major, Officers' Reserve Corps.

Thomas, Landon, 1st Lieutenant, Georgia National Guard.

Thompson, P. W., 1st Lieutenant, Georgia National Guard.

Tucker, John H., 2d Lieutenant, Louisiana National Guard.

Wakefield, C. E., Jr., Captain, Georgia National Guard.

Watkins, Benjamin, 1st Lieutenant, Georgia National Guard.

Watson, E. V., 1st Lieutenant, Officers' Reserve Corps.

Westcott, H. E., 1st Lieutenant, Hawaiian National Guard.

Williamson, Stanley, Captain, Arizona National Guard.

Winn, Cooper, Jr., Major, Georgia National Guard.

Wooley, G. W., 2d Lieutenant, 17th U. S. Infantry.

Wright, E. A., Captain, Georgia National Guard.

Infantry Journal Advertiser

GENTLE HINTS
No. 31

WASHINGTON, D. C.
JULY 1, 1917

1. We admit our mistake. The demand for the INFANTRY JOURNAL far exceeded our own generous estimate.

2. All copies of every issue for this year have been sold. The June number was exhausted by the fifteenth of the month.

3. Our position is peculiar. The cost of production exceeds the subscription price. The difference must be made up by advertising revenue.

4. This is where we need the cooperation of all our readers. Write to our friends whose names appear in the following pages. Each of them has something that some of our readers need. Each of our readers requires something that some of them offer.

5. When our advertisers learn that you have seen their announcements in the INFANTRY JOURNAL, all our problems are solved.

6. We wish that each reader would take the lesson to himself. Write to our advertisers. This is real cooperation. It is the Infantry way! It is the only way!